

Getting Comfortable Being Uncomfortable: Men's Psychobiological and Behavioural  
Responses to and Recovery from a Social-Evaluative Body Image Threat

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## ABSTRACT

Negative body image, which often results from social-evaluative threats, is common in young men and related to many harmful outcomes. Social self-preservation theory (SSPT) suggests that social-evaluative threats elicit psychobiological (e.g., shame and cortisol) and behavioural responses (e.g., submission). Exercise is a long-term coping strategy for negative body image and can reduce psychobiological responses to social-evaluative threats unrelated to the body (e.g., giving a speech to a panel of judges). The present study investigated the psychobiological and behavioural responses to, and recovery from, a social-evaluative body image threat in university men, and whether weight training moderated the expected psychobiological responses. University men ( $N = 69$ ;  $M_{\text{age}} = 20.8$  years,  $SD = 1.84$ ;  $M_{\text{BMI}} = 25.25$  kg/m<sup>2</sup>,  $SD = 3.23$ ) were randomly assigned to a high-threat or low-threat condition. Results showed that men in the high-threat condition had greater levels of post-threat body dissatisfaction, body shame, social physique anxiety, and cortisol compared to men in the low-threat condition after controlling for pre-threat scores (psychological measures), body fat percentage and trait body image. At the recovery time point there were no longer significant differences between conditions. Participants in the high-threat condition also exhibited shame-relevant behaviours to a greater extent than men in the low-threat condition. Weight training did not moderate any of the psychobiological responses. These findings are consistent with SSPT and suggest that men respond to, and recover from, body image threats relatively quickly.

*Keywords: men, body image, weight training, social self-preservation theory, coping*

## TABLE OF CONTENTS

### ABSTRACT

CHAPTER 1: LITERATURE REVIEW .....	1
1.1 Body Image .....	1
1.1.1 Negative body image. ....	2
1.1.2 Men's body image.....	3
1.1.3 Body shame.....	4
1.1.4 Social physique anxiety. ....	6
1.1.5 Body dissatisfaction. ....	7
1.2 SSPT .....	8
1.2.1 Social-evaluative threats. ....	9
1.2.2 Shame.....	9
1.2.3 Cortisol.....	11
1.2.4 Health outcomes of psychobiological responses. ....	13
1.3 SSPT and Body Image .....	14
1.3.1 The application of SSPT to body image. ....	15
1.3.2 Behavioural responses.....	21
1.4 Body Image Coping .....	23
1.5 Exercise.....	24
1.5.1 Exercise and body image. ....	25
1.5.2 Exercise as a coping mechanism for acute psychosocial threats. ....	25
CHAPTER 2: RATIONALE, PURPOSE, AND HYPOTHESES.....	29

2.1 Rationale .....	29
2.2 Purpose.....	35
2.3 Hypotheses .....	36
CHAPTER 3: METHODOLOGY .....	37
3.1 Participants.....	37
3.1.1 Recruitment.....	37
3.1.2 Sample size. ....	38
3.2 Study Design.....	38
3.3 Measures .....	39
3.3.1 Demographic Questionnaire. ....	39
3.3.2 International Physical Activity Questionnaire . ....	39
3.3.3 Weight Training Behaviour Questionnaire.....	40
3.3.4 Male Body Attitudes Scale .....	40
3.3.5 Body Image State Scale .....	41
3.3.6 Weight- and Body-Related Shame Scale .....	41
3.3.7 State Social Physique Anxiety Scale .....	42
3.3.8 Perceived Evaluative Threat . ....	42
3.3.9 Perceptions of Confederates Questionnaire.....	42
3.3.10 Additional manipulation checks.....	43
3.3.11 Pride Coding System .....	43
3.4 Saliva Collection Procedures .....	44
3.4.1 Salivary cortisol assay determinations.....	45

3.5 Procedures .....	46
3.6 Testing Procedures .....	47
3.7 Conditions .....	49
3.7.1 High-threat condition. ....	49
3.7.2 Low-threat condition.....	52
3.8 Anthropometric and Strength Measures .....	55
3.9 Data Entry and Analysis .....	57
3.10 Treatment of Missing and Implausible Values .....	57
3.11 Subscale Recoding and Scoring.....	57
3.11.1 BMI. ....	57
3.11.2 IPAQ-S .....	58
3.11.3 WTB.....	58
3.11.4 MBAS .....	58
3.11.5 WBRSS .....	58
3.11.6 S-SPAS .....	58
3.11.7 BISS .....	58
3.11.8 Cortisol.....	58
3.12 Descriptive Statistics and Correlations .....	59
3.12.1 Means ( <i>M</i> ) and standard deviations ( <i>SD</i> ) by group. ....	59
3.12.2 Correlations by group. ....	59
3.13 Data Screening .....	59
3.13.1 Univariate outliers.....	59

3.13.2 Multivariate outliers.....	59
3.14 Testing of Assumptions .....	60
3.14.1 Univariate normal distribution.....	60
3.14.2 Independent random sampling.....	60
3.14.3 Equal sample sizes among groups. ....	60
3.14.4 Linearity.....	60
3.14.5 Absence of multicollinearity.....	60
3.14.6 Homogeneity of variance.....	60
3.14.7 Homogeneity of regression slopes.....	61
3.15 Manipulation Checks .....	61
3.15.1 Group equivalence.....	61
3.15.2 PET.....	61
3.15.3 Perceptions of confederates.....	61
3.16 Hypothesis Testing.....	61
CHAPTER 4: RESULTS .....	65
4.1 Treatment of Missing Data and Implausible Values.....	65
4.2 Data Screening .....	65
4.2.1 Univariate outliers.....	65
4.2.2 Multivariate outliers.....	66
4.3 Assumptions.....	66
4.3.1 Univariate normal distribution: Skewness and kurtosis.....	66
4.3.2 Independent random sampling.....	67

4.3.3 Equal sample sizes among groups. ....	67
4.3.4 Linearity. ....	67
4.3.5 Absence of multicollinearity. ....	67
4.3.6 Homogeneity of variance. ....	67
4.3.7 Homogeneity of regression slopes. ....	68
4.4 Manipulation Checks .....	68
4.4.1 Group equivalence. ....	68
4.4.2 PET. ....	68
4.4.3 Perceptions of confederates. ....	69
4.5 Descriptive Statistics and Correlations .....	70
4.6 Hypothesis Testing.....	73
4.6.1 Research Question #1. ....	73
4.6.2 Research Question #2. ....	77
4.6.3 Research Question #3. ....	79
4.6.4 Research Question #4. ....	81
CHAPTER 5: DISCUSSION.....	84
5.1 Descriptive Data.....	84
5.2 Hypothesis #1 and 2: Post-Threat and Recovery Psychobiological Responses.....	85
5.2.1 Post-threat psychological responses.....	85
5.2.2 Post-threat and peak response cortisol. ....	87
5.2.3 Recovery psychobiological responses .....	90
5.4 Hypothesis #3: Weight Training as a Moderator of Psychobiological Responses .....	92

5.5 Hypothesis #4: Behavioural Responses .....	95
5.6 Limitations .....	99
5.7 Contributions.....	101
5.7.1 Research.....	101
5.7.2 Body image.....	102
5.8 Implications.....	103
5.8.1 Research.....	103
5.8.2 Body image.....	104
5.9 Future Directions .....	106
5.10 Conclusion .....	109
References .....	110
Appendix A: Questionnaires .....	135
Appendix B: Pride Coding System .....	148
Appendix C: Certificate of Ethics Clearance .....	149



## LIST OF TABLES AND FIGURES

Figure 1: A Visual Representation of the Flow and Timing of Procedures.....	54
Table 1. Descriptive Statistics by Condition.....	69
Table 2. Means and Standard Deviations for Psychological Variables by Condition.....	71
Table 3. Means and Standard Deviations for Cortisol and Percent Change in Cortisol by Condition.....	71
Table 4. Correlations Between Participant Characteristics and Dependent Variables.....	72
Figure 2. Body Shame by Condition.....	74
Figure 3. Social Physique Anxiety by Condition.....	75
Figure 4. Body Dissatisfaction by Condition.....	76
Figure 5. Cortisol by Condition.....	78
Figure 6. Percent Change in Cortisol by Condition.....	79

## **CHAPTER 1: LITERATURE REVIEW**

### **1.1 Body Image**

The term body image was coined by Paul Schilder. He defined it as “the picture of our own body which we form in our own mind” (Schilder, 1950, p.11). The definition of body image has since evolved and is construed as a multidimensional construct involving perceptions and attitudes about one’s physical appearance and functionality (Abbott & Barber, 2010; Brown, Cash, & Mikulka, 1990; Cash, 2004; Cash, Morrow, Hrabosky, & Perry, 2004; Cash & Pruzinsky, 1990). The perceptual component of body image refers to the accuracy of one’s estimation of his or her body size or shape (Cash & Smolak, 2011). However, the majority of research on body image research has focused on the attitudinal component, particularly in nonclinical populations.

The attitudinal component of body image can be divided into three dimensions: cognitive, affective and behavioural (Cash et al., 2004). The cognitive dimension refers to thoughts and beliefs about physical appearance and function (Banfield & McCabe, 2002; Cash & Green, 1986). It encompasses body image investment and evaluation (Banfield & McCabe, 2002; Cash & Pruzinsky, 2002). Body image investment refers to individuals’ beliefs and assumptions about the importance, meaning, and influence of their physical appearance in everyday life (Cash et al., 2004). Greater investment in appearance is associated with characteristics of negative body image (Cash et al., 2004; Muth & Cash, 1997). Evaluation signifies the appraisal of, and degree of satisfaction with, physical appearance and function (Muth & Cash, 1997). Evaluation may relate to overall physical appearance or specific physical characteristics (e.g., abdominal muscles; Abbott &

Barber, 2010; McFarland & Petrie, 2012) and is often based on comparisons to an internalized ideal (Muth & Cash, 1997).

The affective dimension relates to the discrete emotional reactions in response to self-evaluations of physical appearance (Cash, 1994; Muth & Cash, 1997). These emotional responses can range from positive (e.g., pride, esteem) to negative (e.g., shame, anxiety) in nature.

The behavioural dimension reflects the importance individuals place on their physical appearance and involves behaviours used to manage and enhance their appearance, such as clothing choice, diet, and exercise (Cash & Pruzinsky, 2002; Muth & Cash, 1997). The aforementioned components of body image highlight its complex and multidimensional nature.

**1.1.1 Negative body image.** Negative body image is characterized as being worried, concerned or dissatisfied with one's physical appearance (Cash & Smolak, 2011). Understanding factors that affect body image is important given the high prevalence of negative body image among adolescents and young adults (Cash, 2002; Cash & Smolak, 2011; Heatherton, Mahamedi, Striepe, Field, & Keel, 1997; McCabe & Ricciardelli, 2004). A survey conducted in the United States in 1996, with 3,452 women and 548 men, showed that 66% of women and 52% of men were dissatisfied with their weight (Garner, 1997). More recently, Stanford and McCabe (2002) found that 100% of women and 90% of men demonstrated some level of discrepancy between their actual and ideal body, which several researchers believe contributes to body dissatisfaction (Brennan, Lalond, & Bain, 2010; Olivardia, Pope, Borowiecki, & Cohane, 2004).

The high prevalence of negative body image among young adults is concerning given its association with adverse psychosocial and behavioural outcomes. For example, negative psychosocial outcomes include depression, low self-esteem, social anxiety, muscle dysmorphia, suicide ideation, and poor quality of life (Brausch & Muehlenkamp, 2007; Brennan et al., 2010; Cash et al., 2004; Cash & Pruzinsky, 2002; Cash & Smolak, 2011; Grabe, Shibley Hyde, & Lindberg, 2007). Behavioural consequences of negative body image include eating disorders, excessive exercise, poor social functioning, and impaired sexual functioning (Cash & Pruzinsky, 2002; Cash & Smolak, 2011; Levine & Smolak, 2002; Olivardia, 2001; Tantleff-Dunn & Lindner, 2011).

**1.1.2 Men's body image.** The majority of body image research has investigated women, though men increasingly report negative body image. However, unlike women who are concerned primarily with thinness, the central focus of male concern is muscularity (McCreary, 2011; Parent, 2013). Early research suggested that men were fairly satisfied with their bodies given that they were generally less concerned about weight loss, reported fewer eating disorders and dieted less often compared to women (McCreary, 2011). Early research failed to acknowledge the differences in gender ideals and the importance of muscularity to men's body image (McCreary & Sasse, 2000). The male ideal is tall, lean and muscular (Davis, Karvonen, & McCreary, 2005; McCreary & Sasse, 2000). Specifically, the muscular ideal is portrayed with broad shoulders, large pectorals and biceps, well-defined abdominals, a narrow waist and proportional legs (Tiggemann, 2011). By focusing on the drive for thinness and using questionnaires that were developed to measure women's body image, past researchers underestimated the prevalence of men's body image concerns (Cash & Smolak, 2011).

While the existence of the muscular ideal does not necessarily cause negative body image, many men have come to internalize this cultural standard and judge themselves against it (Edwards, Tod, & Molnar, 2014). For many, the muscular ideal defines masculinity and is associated with a number of social benefits, such as being perceived as strong, powerful, confident, and attractive (McCreary, 2011; Petrie & Greenleaf, 2011). These social benefits reinforce the importance of achieving the muscular ideal. Internalization of the ideal has led many men to become dissatisfied with their bodies. Given that it is impossible for most men to attain this muscular physique, they may develop an unhealthy drive for muscularity (McCreary, 2011), which is associated with several manifestations of negative body image.

**1.1.3 Body shame.** Body shame is defined as a negative self-conscious emotion that is experienced when individuals believe they fail to achieve cultural body standards. Body shame is a subtype of the self-conscious emotion shame. Self-conscious emotions, such as shame, guilt and pride, involve reciprocal social judgment, as well as criteria for evaluating the self and others (Lewis, 1971; Tracy & Robins, 2004). Self-conscious emotions differ from basic emotions, such as, sadness, happiness, anger, and fear, in that they are more complex and require self-awareness, self-representation, and self-evaluative processes (Castonguay, Sabiston, Crocker, & Mack, 2014; Sabiston et al., 2010; Tangney & Tracy, 2012). When shame occurs, the failure is generally blamed on internal, uncontrollable, stable, and global causes (Castonguay, Brunet, Ferguson, & Sabiston, 2012; Castonguay et al., 2014; Lewis, 1971; Sabiston et al., 2010; Tracy & Robins, 2004). Most commonly, shame is associated with being a bad person, rather than situational factors.

The antecedents and consequences of body shame have been explored primarily in the context of self-objectification theory (Fredrickson & Roberts, 1997; Noll & Frederickson, 1998). Self-objectification involves scrutinizing the body from a third person perspective, and continually monitoring physical appearance. This constant surveillance of the body increases the likelihood of experiencing body shame because individuals are more likely to notice differences between their actual and ideal body (Noll & Frederickson, 1998). For example, men's bodies are often analyzed and evaluated in relation to the muscular ideal (Noll & Frederickson, 1998). Perceived failure to achieve the ideal may lead to body shame (Castonguay et al., 2012, Noll & Frederickson, 1998). Situations in which the body can be evaluated by others can also lead to body shame in college men (Ozimok, Lamarche, Gammage, & Muir, in progress).

It is important to identify and understand the antecedents of body shame given the negative consequences that can result. Researchers found that body shame mediated the relationship between self-objectification and harmful outcomes, including disordered eating, depression and impaired sexual functioning (Castonguay et al., 2014; Conradt et al., 2007; Daniel & Bridges, 2013). Castonguay et al. (2014) found that body shame was positively associated with depressive symptoms, negative affect, social physique anxiety, and negatively related to self-esteem and physical self-perceptions. Recently, Ozimok et al. (in progress) found that state body shame in men was associated with increased cortisol levels. Furthermore, body shame in men has been linked to harmful psychological and behavioural outcomes, including lower body-esteem, threatened masculinity, and sexual aggression (Castonguay et al., 2014; Conradt et al., 2007; Mescher & Rudman, 2014).

**1.1.4 Social physique anxiety.** Social physique anxiety refers to the distress or concern individuals experience when they believe others are negatively evaluating their bodies (Grieve, Jackson, Reece, Marklin, & Delaney, 2008; Hart, Leary, & Rejeski, 1989; Kruisselbrink, Dodge, Swanburg, & MacLeod, 2004; Russell, 2002). This construct reflects the affective component of body image and differs from most body image constructs as it involves concern with others' evaluations of the body, rather than one's own evaluation (Hart et al., 1989; Martin, Kliber, Kulinna, & Fahlman, 2006). For women, situations that may evoke social physique anxiety include being in a bathing suit at the beach, shopping for clothes, and exercising in public (Bailey, Lamarche, & Gammage, 2014; Lamarche, Kerr, Faulkner, Gammage, & Klentrou, 2012). For men, the gym and the bar have been identified as threatening environments that can elicit social anxiety pertaining to the body (Lamarche, Ozimok, & Gammage, in progress; Leary, 1995; Marquez & McAuley, 2001; Munroe-Chandler & Gammage, 2008).

Most of the research on social physique anxiety has focused on physical activity settings. These settings may be especially difficult since the body is salient and susceptible to evaluation (Frederick & Morrison, 1996; Lamarche, Gammage, & Gabriel, 2011; Martin et al., 2006; Russell, 2002). Individuals with greater levels of trait social physique anxiety may feel discouraged from participating in physical activity, especially in public settings (Chu, Bushman, & Woodard, 2008; Frederick & Morrison, 1996; Grieve et al., 2008; Marquez & McAuley, 2001). Trait social physique anxiety is associated with a number of harmful outcomes in men, including a greater drive for muscularity, muscle dysmorphia, more frequent weight- and body-related comparisons, exercising for appearance benefits, public self-consciousness, disordered eating, lower

levels of self-esteem, negative appearance evaluation, and body dissatisfaction (Carron & Prapavessis, 1997; Frederick & Morrison, 1996; Grieve et al., 2008; McCreary & Saucier, 2009; Russell, 2002; Thomas, Tod, Edwards, & McGuigan, 2014).

While the majority of research involving social physique anxiety has used a dispositional approach, state social physique anxiety has also been investigated (Fletcher & Crocker, 2014; Kruisselbrink et al., 2004; Marquez & McAuley, 2001). Ozimok et al. (in progress) found that men placed in a situation where others could evaluate their bodies experienced increases in state social physique anxiety, body shame, and body dissatisfaction.

**1.1.5 Body dissatisfaction.** Body dissatisfaction is a multidimensional construct involving recurrent body image concerns and reduced satisfaction with one's appearance. It has become normative in today's Western society (Cash et al., 2004; Cramblitt & Pritchard, 2013). Neighbors and Sobal (2007) conducted a study in the U.S. and found that 90% of college women and 70% of college men reported some form of body dissatisfaction. Muscularity, leanness, and height (Tylka, Bergeron, & Schwartz, 2005) are fundamental to men's body satisfaction, though, perceptions and evaluations of specific aspects of the body (e.g., facial features, hair) are also important (Cash et al., 2004; McFarland & Petrie, 2012). Situations in which the body can be judged by others can lead to increases in body dissatisfaction in college men (Ozimok et al., in progress). Media images of the muscular ideal may also contribute to feelings of body dissatisfaction, especially among men who already possess body image concerns (Arbour & Martin Ginis, 2006; Brennan et al., 2010; Cramblitt & Pritchard, 2013; Morrison, Morrison, & Sager, 2004).



Body dissatisfaction is a key factor in men's psychological health and well-being. It has been associated with several harmful psychological and behavioural consequences, including general negative affect, depression, anxiety, low self-esteem, eating disorders, muscle dysmorphia, drive for muscularity, impaired sexual functioning and diminished quality of life (Bergeron & Tylka, 2007; Brennan et al., 2010; Cash et al., 2004; Cash & Fleming, 2002; Cash & Pruzinsky, 2002; Cash & Smolak, 2011; Cramblitt & Pritchard, 2013; Dakanalis et al., 2015; McFarland & Petrie, 2012). Given the adverse outcomes linked to body dissatisfaction, it is important to understand factors that contribute to it. One theory that may help to understand the experience of negative body image, and more importantly, how to cope with it, is social self-preservation theory (SSPT).

## **1.2 SSPT**

The need to belong is a fundamental human motivation (Baumeister & Leary, 1995; Gruenewald, Kemeny, Aziz, & Fahey, 2004). SSPT claims that people monitor their environments for threats to their social selves to ensure overall well-being (Dickerson, 2008; Dickerson, Gruenewald, & Kemeny, 2004; Gruenewald, Dickerson, & Kemeny, 2007; Kemeny, Gruenewald, & Dickerson, 2004). These threats, termed social-evaluative threats, indicate that one's social standing is at risk. According to SSPT, social-evaluative threats elicit a specific set of psychobiological and behavioural responses characterized by feelings of low social worth, self-conscious emotions (e.g., shame), behavioural outcomes (e.g., submission, wanting to hide) and activation of the hypothalamic-pituitary adrenal (HPA) axis, which initiates the fight or flight response to stressors (Dickerson, 2008; Dickerson & Kemeny, 2004; Gruenewald et al., 2004; Kemeny et al., 2004). Thus, SSPT specifies both the immediate psychobiological

responses (Kemeny, 2009) as well as the behavioural and cognitive coping responses that should subsequently occur following a social-evaluative threat.

**1.2.1 Social-evaluative threats.** Social-evaluative threats occur when there is a real or potential loss of social status, social esteem or social acceptance from others (Baumeister & Leary, 1995; Dickerson, Gable, Irwin, Aziz, & Kemeny, 2009; Dickerson, Gruenewald et al., 2004). Gruenewald et al. (2004) defined social-evaluative threats as situations involving the potential to demean one's social self by casting doubt on valued traits or abilities. Social-evaluative threats occur in situations where the self can be negatively judged by others (Dickerson, Gruenewald et al., 2004). Since humans are highly motivated to create and maintain a positive social image, these situations are powerful stressors (Gruenewald et al., 2004). Social-evaluative threats occur in a variety of situations including: (1) rejection-laden contexts where one could be deemed unworthy of acceptance, (2) performance-based contexts where one is required to display a valuable skill or trait, and (3) uncontrollable contexts where an unfavourable characteristic may be brought to light (Dickerson, Gruenewald et al., 2004). SSPT maintains that in reaction to a social-evaluative threat, a psychobiological response is initiated to act as a warning system. The psychobiological response involves the experience of self-conscious emotions, most significantly shame, and physiological responses, including cortisol.

**1.2.2 Shame.** SSPT posits that shame is the key psychological response to social-evaluative threats, though other self-conscious emotions have also been associated, including embarrassment, humiliation, and low self-esteem (Dickerson, Kemeny et al., 2004; Gruenewald et al., 2004; Kemeny et al., 2004). Shame differs from guilt and other self-conscious emotions in that the focus of shame is on the self, rather than one's

behaviour (Lewis, Sullivan, Stanger, & Weiss, 1989; Tangney, Wagner, & Gramzow, 1992). It arises with negative self-evaluation when a core aspect of the self is judged as inferior or inadequate (Gilbert, 1997; Tangney, 1995). Shame occurs when perceptions of others' negative social evaluation are transformed into negative self-evaluations (Dickerson, Gruenewald et al., 2004). For example, one might fail a test and subsequently deem him or herself a bad student. Thus, shame can be experienced with or without an audience (Dickerson, Kemeny, Aziz, Kim, & Fahey, 2004). Shame is thought to serve an important function; it signals to the individual that his or her social acceptance is at risk (Dickerson, Gruenewald et al., 2004).

The motivational states and behaviours associated with shame include submission, withdrawal and disengagement (Dickerson, Gruenewald et al., 2004). The experience of shame often leads to a desire to disappear, hide, and escape the situation in order to prevent further loss of social acceptance (Tangney, Miller, Flicker, & Barlow, 1996; Wicker, Payne, & Morgan, 1983). Behavioural displays associated with shame include head down and a slumped posture (Gilbert, 2000; Keltner, 1995, Tracy & Robins, 2007). Tangney et al. (1996) found that individuals reported feeling more inferior and physically smaller than others, when they experienced shame. They also believed that others were angry with them (Tangney et al., 1996). Defensive humour, self-deprecating jokes and nervous grinning have also been associated with self-conscious emotions including shame (Barwick, 2012; Leary, Britt, Cutlip, & Templeton, 1992; Tangney et al., 1996). Additionally, shame may be accompanied by physiological changes, including blushing, sweating, increased heart rate, and an increase in cortisol (Dickerson, Kemeny

et al., 2004; Gross, Schote, Schneider, Schulz, & Meyer, 2014; Leary et al., 1992; Tangney et al., 1996).

**1.2.3 Cortisol.** An increase in cortisol is the main physiological response investigated in SSPT research (Dickerson, Gruenewald et al., 2004), though other responses including heart rate, blood pressure, and proinflammatory cytokine activity have also been implicated (Bosch et al., 2009; Dickerson, Gruenewald, & Kemeny, 2009; Dickerson, Kemeny et al., 2004). Cortisol is a hormone released as a result of the activation of the hypothalamic-pituitary-adrenal (HPA) axis and plays an important role in metabolism, energy production, and regulating normal physiological functioning (Dickerson, Gruenewald et al., 2004; Gruenewald et al., 2004)).

The HPA system can be activated in stressful situations (Dickerson, Gruenewald et al., 2004). Stressful situations, or “stressors”, are defined as conditions that involve a threat to a major goal, such as the maintenance of one’s physical or psychological well-being (Lazarus & Folkman, 1984; Kemeny, 2003). Cortisol generally increases in response to a stressful situation to help a person cope with the threat (i.e., fight or flight response). There is a linear increase in cortisol following a stressor which usually peaks 20 to 40 minutes after the onset of the stressor and returns to baseline 40 to 60 minutes after the end of the stressor, depending on the type of threat (Dickerson & Kemeny, 2004). For example, social-evaluative threats that involve uncontrollable and social-evaluative elements are associated with slower recovery times, where cortisol levels may remain elevated for over an hour after the threat (Dickerson & Kemeny, 2004).

Human beings display diurnal variations in cortisol. Cortisol levels peak early in the morning (i.e., awakening response) and then naturally decrease until midnight, with a

slight peak around midday (Dickerson & Kemeny, 2004). To account for the diurnal variations, most studies investigating cortisol responses to laboratory stressors have tested all participants at the same time of day, usually in the afternoon when cortisol levels are low and most stable (Dickerson & Kemeny, 2004).

The increase in cortisol following a stressor is accompanied by a number of physiological changes. Cortisol can suppress certain functions of the immune system and digestive system. It can act as an anti-inflammatory and it can help other physiological systems to function, including the cardiovascular system, by inducing vasoconstriction and increasing heart rate (Dickerson & Kemeny, 2004). Essentially, the body responds to stressors by mobilizing the physiological systems necessary to handle the threat and suppressing those that are not. The increase in cortisol following a stressor is adaptive in nature since it can mobilize energy and activate other physiological systems necessary for handling a threat (Lovallo & Thomas, 2000; Sapolsky, Romero, & Munck, 2000).

The HPA system is not activated to the same extent in all stressful situations (Dickerson & Kemeny, 2004). Social-evaluative threats generally lead to greater increases in cortisol compared to stressful situations without social evaluation (Dickerson & Kemeny, 2004; Dickerson, Mycek, & Zaldivar, 2008; Gruenewald et al., 2004; Het, Rohleder, Schoofs, Kirschbaum, & Wolf, 2009; Kemeny, 2003; Kemeny et al., 2004). For example, Dickerson and Kemeny (2004) performed a meta-analytic review of 208 acute laboratory stress studies and identified several characteristics that were associated with greater increases in cortisol. They found that conditions involving negative social evaluation within a relatively uncontrollable, motivated performance task were associated with significantly greater increases in cortisol than otherwise similar tasks without social

evaluation. These tasks were also associated with a slower recovery. Uncontrollability, defined as not being able to control the outcome, was an important factor as individuals could not succeed despite their best efforts (Dickerson & Kemeny, 2004). Ego involvement, which is characterized by the importance of the task or characteristic to the individual, was another critical factor. Evaluation of a task or attribute that was important to the participant led to greater increases in cortisol than performing a task that he or she considered insignificant. Furthermore, conditions involving negative social comparison, as well as a permanent record of performance (e.g., video recording) were also associated with greater increases in cortisol (Dickerson & Kemeny, 2004). Situations involving a combination of the aforementioned factors elicited the greatest increases in cortisol followed by the slowest recoveries (Dickerson & Kemeny, 2004). In some cases, cortisol levels remained elevated for up to one hour after the termination of the threat (Dickerson & Kemeny, 2004).

**1.2.4 Health outcomes of psychobiological responses.** While the psychobiological responses to social-evaluative threats themselves are thought to be functional (i.e., they warn that there is a threat to one's social status), prolonged or repeated exposure to high levels of shame and cortisol can be detrimental to one's health (Dickerson, Gruenewald et al., 2004; Dickerson et al., 2009; Kemeny et al., 2004). Uncoordinated or excessive activation of these physiological systems, or failing to habituate to, or recover from, chronic stressors can lead to the onset and progression of a variety of negative health conditions, including heart disease, diabetes, depression, anxiety, metabolic syndrome, respiratory infections, autoimmune disease, myopathy, hypertension, impaired sexual functioning and amenorrhea (Dickerson, 2008; Dickerson

et al., 2009; Kemeny, 2003; McEwen, 2008; Starkman & Schteingart, 1981). Thus, repeatedly experiencing and failing to recover from or cope with, regular social-evaluative threats, could result in increased vulnerability to a variety of diseases and poor health conditions (Dickerson, 2008).

### **1.3 SSPT and Body Image**

There are a number of theories that have been applied to understanding body image. For example, sociocultural theory has explored body image by investigating the influence of cultural values, such as physical attractiveness, on human behaviour (Cash & Pruzinsky, 2002; Jackson, 2002). Self-objectification theory claims that individuals living in sexually objectifying cultures may take on an observer's perspective of their bodies and judge themselves and their appearance based on their ability to imitate the cultural ideals (Fredrickson & Roberts, 1997). Social comparison theory states that people are likely to compare themselves to others based on attributes they consider to be important (Festinger, 1954). However, none have addressed the psychological, physiological and behavioural responses to uncomfortable body image situations, namely, social-evaluative body image threats. SSPT addresses these limitations.

There are two important reasons why SSPT may be useful for understanding negative body image, and more importantly, how to cope with it. First, physical appearance is an important aspect of social acceptance in North American society. For example, physical attractiveness according to Western ideals is associated with greater social benefits and resources, such as being perceived as intelligent, socially skilled, popular, dominant, and mentally healthy (Feingold, 1992). Physical attractiveness has also been associated with getting more promotions, having higher paying jobs, and being

more likely to get married (Feingold, 1992). On the other hand, physical unattractiveness can lead to social exclusion (Baumeister & Tice, 1990). SSPT suggests that social-evaluative threats involving a domain of importance elicit the strongest psychobiological responses (Dickerson, 2008; Dickerson, Gruenewald et al., 2004).

Second, given the high value placed on physical appearance in North American society (Brennan et al., 2010), situations where the body is revealed and susceptible to evaluation can be potent stressors for many individuals (Carron & Prapavessis, 1997; Gammage, Martin Ginis, & Hall, 2004; Hart et al., 1989). These situations are common in everyday life, particularly for women (Lamarche et al., 2012). According to self-objectification theory, women are often treated as sexual objects; their bodies are regularly observed and evaluated (Fredrickson & Roberts, 1997). Recent evidence suggests that men are also vulnerable to this type of evaluation (Lamarche et al., in progress; Martins, Tiggemann, & Strong, 2007; Munroe-Chandler & Gammage, 2008; Ozimok et al., in progress).

**1.3.1 The application of SSPT to body image.** The application of SSPT as a theoretical framework to investigate body image is a recent development in body image research. Several studies have demonstrated that responses to negative body image situations can be examined using SSPT. Lamarche et al. (2012) used a qualitative design to examine body image threats experienced by college women. They conducted interviews with 23 women and asked them to identify and describe comfortable and uncomfortable body-related situations. With regards to uncomfortable situations, the context, responses and coping strategies described were consistent with SSPT. For example, the most uncomfortable situations were those that involved body exposure, such



as wearing a bathing suit, in the presence of others, particularly an ideal other, with the potential for social evaluation. Participants also described psychological (e.g. shame) and physiological (e.g., increased heart rate, sweating) responses to body image threats consistent with the stress response described in SSPT. The coping strategies reported, including using clothing to hide the body, avoiding uncomfortable body image situations altogether (i.e., avoidance), and exercising and dieting to change the body to better reflect society's standards (i.e., appeasement), also corresponded with SSPT (Dickerson et al., 2004; Kemeny et al., 2004). Bailey et al. (2014) found similar results and provided further qualitative support for the application of SSPT to body image in a study that investigated women's strategies for coping with uncomfortable body image situations.

Martin Ginis et al. (2012) conducted the first experimental study that applied SSPT to body image. They investigated cortisol responses to an anticipated social-evaluative body image threat in college women. They manipulated participants' exposure to an anticipated social-evaluative body image threat, or non-social-evaluative body image threat, in two experiments. In the first experiment, participants in the experimental condition were told that a man would videotape them wearing a halter-top and spandex shorts while exercising in a public fitness facility. In the control condition, participants were told that they would exercise in a private room while wearing a baggy tracksuit. In the second experiment, participants in the experimental condition were asked to try on revealing exercise clothing in a mirrored change room and told that they would have to come out so that the researcher could evaluate the fit of the clothing. A video camera was also set up and participants were informed that the recording would be shown to an independent panel that would also evaluate the fit of the clothing. In the control

condition, participants were asked to try on the same revealing exercise clothing in the change room and told that no one else would see them in the clothing.

In both experiments, participants in the threat conditions had significantly higher cortisol levels following the anticipation of a social-evaluative body image threat compared to participants in the control condition. These findings support SSPT's claim that social-evaluative threats activate the HPA axis and result in the release of cortisol. They also suggest that social-evaluative threats apply to appearance-based situations. Furthermore, Martin Ginis et al. (2012) suggested that cortisol levels are affected by the anticipation of a social-evaluative body image threat, independent of the actual exposure to the threat. However, it is worth noting that the participants in both experiments had unusually high baseline levels of cortisol and the significant differences in post-manipulation cortisol levels between groups were due to reductions of cortisol levels in the control conditions, rather than increases in cortisol in the experimental conditions. Nonetheless, the continued elevation of cortisol in the experimental groups, and slight increase in Experiment 2, are noteworthy.

Lamarche et al. (2014) extended the applicability of SSPT to body image by examining both psychological (e.g., shame) and physiological (e.g., cortisol) responses to an anticipated social-evaluative body image threat in university women. In the threat condition, participants were told that they would undergo a test of body composition while wearing a jog bra and spandex shorts. Participants in the control condition sat quietly for 10 minutes. Findings showed that anticipation of a social-evaluative body image threat elicited significant increases in shame, but no increase in cortisol. Lamarche et al. (2015) also provided support for the shame response in a study that investigated

psychological and heart rate responses to an imagined social-evaluative body image threat in women. Cloudt et al. (2014) manipulated the amount of social-evaluative threat through the number of evaluators present (e.g., individual-threat, group-threat, control), and investigated its influence on the psychobiological responses to an anticipated social-evaluative body image threat in university women. Participants in both threat conditions had significantly greater post-threat levels of shame and cortisol than the control condition, with no significant differences in shame or cortisol between the individual-threat and group-threat conditions. Consistent with Martin Ginis et al. (2012), the significant differences in cortisol levels between the threat conditions and the control condition were due to a decrease in cortisol levels in the control condition rather than an increase in cortisol in the threat conditions. These studies suggest that the anticipation of a social-evaluative body image threat can elicit negative psychological outcomes; however, actual exposure to a threat may be necessary to elicit increases in cortisol.

Although these studies provide preliminary evidence that social-evaluative body image threats elicit responses consistent with SSPT, there are limitations that should be noted. First, none of these studies investigated responses to actual exposure to a social-evaluative body image threat. Growing evidence supports the notion that experiencing a social-evaluative threat is necessary to elicit physiological responses consistent with SSPT (Cloudt et al., 2014; Dickerson & Kemeny, 2004; Gruenewald et al., 2004; Martin Ginis et al., 2012). Second, none of these studies examined recovery from a social-evaluative body image threat. Third, these studies investigated women only. Fourth, none analyzed participants' behavioural responses to a social-evaluative body image threat.

To address the first two limitations, Lamarche, Gammage, Kerr, Faulkner, and Klentrou (2016) conducted a study that investigated women's psychobiological responses to, and recovery from, actual exposure to a social-evaluative body image threat. Results showed that participants in the high-threat condition, who underwent a test of body composition wearing a two-piece bathing suit, reported greater levels of social physique anxiety and had higher cortisol post-threat compared to their baseline and recovery levels. In other words, social physique anxiety and cortisol increased from baseline to post-threat and returned to levels similar to baseline at the recovery time point. In the control condition, there were no differences between baseline, post-threat, and recovery levels of social physique anxiety; cortisol levels decreased from baseline to recovery. These findings provide further support for the argument that actual exposure to a threat is necessary to elicit increases in cortisol. Furthermore, these findings suggest that young women recover relatively quickly from social-evaluative body image threats.

As previously noted, all of the aforementioned studies investigated women only. To address this limitation Lamarche et al. (in progress) conducted interviews with university men in a qualitative study to examine comfortable and uncomfortable body image situations. Men identified uncomfortable body image situations such as being at the gym and at the bar. Consistent with previous research (Marquez & McAuley, 2001), participants explained that these situations were more uncomfortable if they were in the presence of women, especially women they thought were attractive, or another male they considered to be fit or attractive, and if they were wearing less clothing (e.g., no shirt on). These findings provide preliminary qualitative evidence that men also experience

uncomfortable body image situations, especially if the situation includes the potential for social evaluation.

More recently, Ozimok et al. (in progress) conducted the first experimental study that investigated psychobiological responses to a social-evaluative body image threat in men. The researchers experimentally manipulated a social-evaluative body image threat using the findings from Dickerson and Kemeny (2004), Lamarche et al. (in progress), and Munroe-Chandler and Gammage (2008). Men in the high-threat condition underwent body size and strength measurements along with a male confederate who represented the muscular ideal. The male confederate was tested first, without wearing a shirt. His measurements were taken and read aloud by a female confederate who represented the female ideal. Once all measurements were completed, the female confederate read the male confederate's results aloud so that the participant could hear them. Next, the participant underwent the same measurements, without wearing a shirt. A video camera was also set up to increase the intensity of the threat. In the low-threat condition, the same procedures took place however, there were no confederates or video camera, the participant wore his shirt, and only one research assistant was present. Ozimok et al. (in progress) found that men in the high-threat condition had higher levels of body shame, body dissatisfaction, social physique anxiety, and cortisol compared to those in the low-threat condition. Importantly, the differences in cortisol were due to an increase in the high-threat condition. These findings suggest that men exhibit psychobiological responses consistent with SSPT following a social-evaluative body image threat. They also support the contention that actual exposure to a social-evaluative threat is necessary to elicit a cortisol response.

In conclusion, the application of SSPT to body image is still in its preliminary stages. However, a number of studies have provided support that social-evaluative body image threats elicit both psychological (Cloudt et al., 2014; Lamarche et al., 2015; Lamarche et al., 2014; Ozimok et al., in progress) and physiological (Cloudt et al., 2014, Lamarche et al., 2016; Martin Ginis et al., 2012; Ozimok et al., in progress) responses consistent with SSPT. To date, no studies have investigated men's recovery from a social-evaluative body image threat or the behavioural responses to such threats. Social-evaluative body image threats are common and contribute to negative body image. Thus, it is important to understand how individuals respond (psychologically, physiologically, and behaviourally) to, and recover from, these threats in order to develop effective coping strategies.

**1.3.2 Behavioural Responses.** As previously noted, no research has systematically investigated men's behavioural responses to a social-evaluative body image threat. Lamarche et al. (in progress) qualitatively investigated men's responses to and coping strategies for managing uncomfortable body image situations. Men reported behaviours such as diet and exercise, drinking alcohol, and using supplements to deal with uncomfortable body image situations; however, these behaviours do not reflect the way that men behave while they are actually experiencing a body image threat. Given that men feel it is not social acceptable for them to discuss or admit their body image concerns (Lamarche et al., in progress), it is important to investigate men's behavioural responses, including posture or facial expressions, to uncomfortable body image situations as they can provide information about the way men feel while they are actually experiencing an uncomfortable body image situation. By contrast, self-report measures,

which are typically completed after a manipulation, reflect the way that participants have cognitively processed the feelings and emotions they experienced during the threat. Additionally, behavioural responses are continuous and harder to fake or manipulate in comparison to self-report measures. Furthermore, relying exclusively on self-report measures can be problematic, as they require participants to be aware of their emotions, able to distinguish them from similar emotions and willing to reveal them (Keltner & Harker, 1995). Lastly, investigating behavioural responses in addition to psychological and physiological responses ultimately helps to provide a more complete picture of men's uncomfortable body image situations and ultimately increases the validity and credibility of results.

Behavioural responses to social-evaluative threats are also an important component of SSPT. These responses are designed to prevent the individual from further loss of social acceptance. As previously noted shame is associated with a number motivational states and behaviours including submission, withdrawal and disengagement (Dickerson, Gruenewald et al., 2004). The behavioural display of shame includes a downward tilted head and a slumped posture, where the individual often attempts to appear physically smaller than others (Gilbert, 2000; Keltner, 1995, Tracy & Robins, 2007). To date, limited research has explored the behavioural responses associated with shame (Gilbert, 2000; Keltner, 1995; Tangney et al., 1996). This may be due to the lack of measures available for analyzing shame-relevant behaviours. One measure that exists is the Pride Coding System (Tracy & Robins, 2007), which was designed to investigate nonverbal behavioural displays of pride and shame. This measure has been used to investigate athlete's behavioural responses to a win or loss at the Olympics using photo

analysis (Tracy & Matsumoto, 2008). Other research has used video analysis to investigate facial expressions during a social-evaluative threat using the Emotion Facial Action Coding System (EMFACS) version of the Facial Action Coding System (Lupis, Sabik, & Wolf, 2016).

#### **1.4 Body Image Coping**

Despite substantial research on body image, only a small amount has focused on body image coping (Cash et al., 2005; Cash & Smolak, 2011). Coping refers to the emotional, behavioural, and cognitive adaptations used to manage situations that are perceived to be potentially harmful, threatening or challenging (Folkman & Lazarus, 1988; Lazarus & Folkman, 1984). Depending on the context and intention of use, certain coping strategies may be more beneficial and support positive functioning, while others may be less effective or even detrimental (Bailey et al., 2014; Choma, Shove, Busseri, Sadava, & Hosker, 2009; Endler & Parker, 1994).

The majority of research on body image coping has focused on women and adolescents. A number of qualitative studies found similarity in strategies reported, including avoidance, appearance fixing, social comparison, social support, acceptance, humour, religion, dieting, and exercise, for handling uncomfortable body image situations in women (Bailey et al., 2014; Lamarche et al., 2012; Smith-Jackson, Reel, & Thackeray, 2011) and adolescents (Kowalski, Mack, Crocker, Niefer, & Fleming, 2006; Sabiston, Sedgwick, Crocker, Kowalski, & Mack, 2007). Specifically, Lamarche et al. (2012) and Smith Jackson et al. (2011) found that exercise was the most frequently reported long-term coping strategy in samples of university women.



There is limited research with regards to men's body image coping. Lamarche et al. (in progress) conducted a qualitative study to investigate uncomfortable body image situations in college men and found that men working out to get bigger and wanting to hide were reported as common coping strategies. However, better understanding of body image coping in men is needed. The findings in the body image coping literature have been fairly consistent with regard to the common use of maladaptive coping strategies. Thus, it is important to investigate healthy coping strategies for managing uncomfortable body image situations. Given that exercise is frequently cited as a way to manage body image concerns (Bailey et al., 2014; Kowalski et al., 2006; Lamarche et al., 2012; Lamarche et al., in progress; Ozimok et al., in progress; Sabiston et al., 2007; Smith-Jackson et al., 2011), further investigation of exercise as a body image coping strategy is warranted.

### **1.5 Exercise**

Exercise can be defined as planned, repetitive physical activity that is performed to maintain or improve physical fitness (Caspersen, Powell, & Christenson, 1985). Fitness benefits of exercise include improvements in cardiovascular endurance, muscular strength and endurance, body composition (e.g., level of muscularity and body fat) and flexibility (Caspersen et al., 1985). Exercise can also lead to psychological benefits (Fallon & Hausenblas, 2004; Klaperski, von Dawans, Heinrichs, & Fuchs, 2014). For example, exercise is associated with increases in positive affect and reductions in negative affect (e.g., stress, anxiety, depression; Anshel, 1996; Fallon & Hausenblas, 2004). Chronic exercise programs have also been associated with improvements in ability to cope with acute stress, including psychosocial stress (Klaperski et al., 2014).

**1.5.1 Exercise and body image.** The majority of research indicates that exercise is associated with improved body image (Campbell & Hausenblas, 2009). Three meta-analyses have investigated the relationship between exercise and body image (Campbell & Hausenblas, 2009; Hausenblas & Fallon, 2006; Reel et al., 2007). The studies included in these meta-analyses vary significantly in terms of the populations sampled, the measures used, as well as the type and intensity of exercise investigated. Despite this variability, the three meta-analyses consistently found that exercise had a positive effect on body image (Campbell & Hausenblas, 2009; Hausenblas & Fallon, 2006; Reel et al., 2007).

Hausenblas and Fallon (2006) conducted the first meta-analysis with 121 published and unpublished studies that investigated the impact of exercise on body image. The studies included intervention, single group, and correlational designs. Results showed that (1) following an exercise intervention, participants in the exercise groups reported a more positive body image than those in the control conditions; (2) exercisers' body image improved after participating in an exercise intervention; and (3) exercisers reported a more positive body image than non-exercisers (Hausenblas & Fallon, 2006). Subsequent meta-analyses found similar effects of exercise with small to moderate effect sizes reported (Campbell & Hausenblas, 2009; Reel et al., 2007). Thus, exercise may be a promising intervention for coping with negative body image (Campbell & Hausenblas, 2009; Hausenblas & Fallon, 2006; Reel et al., 2007).

**1.5.2 Exercise as a coping mechanism for acute psychosocial threats.** While exercise is generally considered a coping strategy for managing body image concerns, some evidence suggests that exercise interventions may also help to manage other

stressful events including acute social-evaluative threats. For example, Klaperski et al. (2014) investigated whether participation in an exercise program led to reductions in the physiological stress response to a psychosocial stressor in men. They found that men who participated in a 12-week aerobic exercise program had significantly reduced cortisol, heart rate and heart rate variability responses to a psychosocial stressor, compared to those in the relaxation training group and the control group. Similarly, Calvo, Szabo, and Capafons (1996) investigated the effects of a 12-week general fitness exercise program on responsiveness to psychosocial stress in male and female undergraduates. Participants in the exercise condition exhibited lower behavioural anxiety while anticipating the stress tasks, lower cognitive and somatic anxiety during the stress tasks, and faster heart rate recovery after the tasks, compared to the control condition.

Similar benefits of chronic exercise programs have been demonstrated to reduce psychobiological responses to other psychosocial stressors (e.g., examinations, losing against a female competitor on a motor task and receiving unpleasant feedback; Anshel, 1996; von Haaren, Haertel, Stumpp, Hey, & Ebner-Priemer, 2015). Anshel (1996) found that men who participated in a 10-week aerobic exercise program responded to an acute stressor with more positive affect, reduced heart rate, lower systolic blood pressure, and better motor performance than those in the progressive relaxation, placebo, and control groups. These findings support the contention that exercise may be an effective long-term strategy for coping with acute stress. However, all of these studies were conducted with non-exercisers, with the exception of Calvo et al. (1996), where participants' exercise history is unclear. Thus, these studies do not indicate whether regular exercise serves to protect against psychosocial threats in the long-run. Additionally, none of these studies

investigated shame, which is a common response to social-evaluative threats according to SSPT (Dickerson, Gruenewald et al., 2004).

Correlational research has found that regular exercisers show reduced physiological reactivity to acute stressors compared to non-exercisers. Klaperski, von Dawans, Heinrichs, and Fuchs (2013) conducted a study that investigated whether female regular exercisers showed reduced physiological and psychological reactivity to a psychosocial stressor compared to non-exercisers. Three groups of women participated: 15 vigorous exercisers, 15 moderate exercisers, and 17 infrequent or non-exercisers. Participants in each group underwent a social-evaluative threat. Women in each group experienced increases in heart rate, cortisol, and state anxiety, along with decreases in mood and calmness following the social-evaluative threat. However, women in the active groups showed lower physiological reactivity than non-exercisers.

Similar results have been found for male regular exercisers. Rimmele et al. (2007) investigated whether trained men showed reduced physiological and psychological responsiveness to psychosocial stress compared to untrained men. Participants included 22 trained men (elite athletes) and 22 untrained men who were exposed to psychosocial stress. Following the stressor, both groups showed increases in cortisol and heart rate responses. However, trained men had significantly lower cortisol levels and heart rates compared to untrained men. Additionally, trained men reported better mood, greater calmness and showed a trend toward lower state anxiety, compared to untrained men.

Similarly, Rimmele et al. (2009) investigated whether the level of physical activity influenced responsiveness to psychosocial stress in three groups of men (elite sportsmen, amateur sportsmen, untrained men). Elite sportsmen showed significantly

lower heart rate, state anxiety and cortisol responses compared to untrained men following the social-evaluative threat. Amateur sportsmen exhibited reduce heart rate but no difference in cortisol response compared to untrained men.

Taken together, these studies suggest that habitual exercise may help buffer against psychosocial stress by reducing psychological and physiological reactivity to acute psychosocial stressors, including social-evaluative threats (Forcier et al., 2006; Klaperski et al., 2014; von Haaren et al., 2015). Although none of the previous research involved stress pertaining to evaluation of the body, the psychological and physiological benefits of exercise may help individuals cope with acute social-evaluative body image threats by reducing psychobiological responses. Moreover, habitual exercise may affect individuals' appraisals of stressful events pertaining to the body (Rimmele et al., 2007). In exercise facilities, the body is salient and susceptible to evaluation. Habitual exercisers may be accustomed to this evaluative potential and may subsequently experience reduced emotional and physiological reactivity to social-evaluative body image threats. For example, Claytor (1991) found that trained men exhibited attenuated cardiovascular and sympathetic nervous system responsiveness to familiar stressful tasks compared to untrained men. In conclusion, regular exercise may be an effective coping strategy for managing acute social-evaluative body image threats in young men.

## **CHAPTER 2: RATIONALE, PURPOSE, AND HYPOTHESES**

### **2.1 Rationale**

Although the majority of body image research has focused on women, increasing evidence shows that men also suffer from negative body image (McCreary, 2011). Many men report dissatisfaction with various aspects of their appearance, especially with regards to muscularity (McCabe & Ricciardelli, 2004; McCreary, 2011; Parent, 2013). This research suggests that men may suffer from negative body image to almost the same extent as women, but are less likely to voice their concerns for fear of being perceived as “unmanly” or less masculine (Lamarche et al., in progress; McCabe & Ricciardelli, 2004; Pope, Phillips, & Olivardia, 2000). Thus, many men are likely to suffer from body image concerns in silence.

Young adulthood appears to be a critical time with respect to experiencing negative body image, particularly for those in college or university. In fact, post-secondary institutions have been called a “breeding ground” for body image concerns, as they provide many opportunities for the body to be evaluated (Striegel-Moore & Franko, 2002). In college men, body image concerns are associated with several harmful psychological and behavioural outcomes that can last throughout life, including depression, eating disorders, low self-esteem, poor psychosocial adjustment, social avoidance, exercise dependence, muscle dysmorphia, supplement abuse, steroid use, and suicide ideation (Brausch & Muehlenkamp, 2007; Grabe et al., 2007; Kanayama, Barry, Hudson, & Pope, 2006; Leary, 1992, McCabe & Ricciardelli, 2004; Olivardia, 2001; Parent & Moradi, 2011). Recent research has also shown that poor body image is associated with physiological outcomes, such as increased cortisol levels (Cloutd et al.,

2014; Martin Ginis et al., 2012; Ozimok et al., in progress), which are associated with a number of harmful outcomes, including heart disease, diabetes, and depression (Dickerson, 2008; Dickerson et al., 2009; Kemeny, 2003).

There are likely a number of factors that have contributed to the rise in negative body image among men. One is the emergence of the muscular ideal that has been prevalent in Western society the last few decades. While mere exposure to idealized images does not guarantee negative body image, awareness and internalization of the ideal can be detrimental (Mescher & Rudman, 2014). Given that the ideal is unattainable for most men, those who adopt this standard may be at risk of experiencing body dissatisfaction, body shame and developing a greater drive for muscularity (Brennan et al., 2010; Cramblitt & Pritchard, 2013; Mescher & Rudman, 2014). In addition, men may feel uncomfortable in situations where others can evaluate their bodies for fear that they will be judged negatively against society's standards (Lamarche et al., in progress). Research suggests that social-evaluative body image threats are common in everyday life and may eventually lead to negative body image (Gammage et al., 2004; Lamarche et al., 2012; Martin Ginis et al., 2012). Therefore, finding ways to effectively cope with body image threats, and ultimately negative body image, is imperative to the health and well-being of young men.

While several theories have been applied to body image, none have accounted for the psychological, behavioural, and physiological responses to negative body image situations, nor do they address how these situations can be managed. In fact, effective coping strategies for body image threats have been understudied and explored

atheoretically. SSPT addresses these limitations and may be helpful in understanding both negative body image situations, and how individuals cope with them.

SSPT claims that people monitor their environments for threats to their social selves to ensure overall well-being (Dickerson, 2008). Social-evaluative threats occur when there is a real or potential loss of social acceptance from others and they elicit a specific psychobiological response (Dickerson, Gruenewald et al., 2004). This response includes increases in shame and cortisol, which lead to appeasement, disengagement, or submissive behaviours to prevent further loss of social acceptance (Dickerson, Gruenewald et al., 2004). Therefore, SSPT identifies the immediate psychobiological responses as well as the behavioural and cognitive adaptations that occur following a social-evaluative threat.

SSPT posits that shame is the key psychological response to a social-evaluative threat, as it immediately signals to individuals that their social acceptance is at risk (Dickerson, 2008). Cortisol is the main physiological response that has been investigated in SSPT research (Dickerson & Kemeny, 2004). As noted in Chapter 1, several researchers have shown that social-evaluative threats lead to greater increases in cortisol than stressful situations without social evaluation. Both the shame and cortisol responses to a social-evaluative threat may be adaptive in the short-term, however repeated and prolonged activations of these responses can be harmful in the long-term (Dickerson, Gruenewald et al., 2004; Dickerson et al., 2009; Kemeny et al., 2004).

Growing evidence supports the application of SSPT to understand better how women respond to body image threats (Cloudt et al., 2014; Lamarche et al., 2015; Lamarche et al., 2014; Lamarche et al., 2016; Lamarche et al., 2012; Martin Ginis et al.,



2012). Recently, Ozimok et al. (in progress) conducted an experimental study to investigate responses to a social-evaluative body image threat in university men. They manipulated a social-evaluative body image threat by creating an uncomfortable body image situation using a variety of factors that have been reported as threatening to men's body image, such as wearing less clothing and being in the presence of an attractive female or an ideal male (Lamarche et al., in progress). The researchers found that participants' responses in the high-threat condition were consistent with SSPT, including significantly greater levels of cortisol and body shame, compared to participants in the low-threat condition. These findings indicate that men also suffer from body image concerns and elicit responses consistent with SSPT in situations where others may evaluate their bodies. The results of this study are concerning given that (1) social-evaluative body image threats contribute to negative body image and are common in everyday life, and (2) body shame and cortisol are associated with a number of adverse health outcomes. Thus, it is necessary to investigate men's psychological, physiological, and behavioural responses to, and recovery from social-evaluative body image threats. To date, no studies have investigated how men respond behaviourally to social-evaluative body image threats or how they recover from these threats. Furthermore, it is important to research healthy, effective coping strategies to help men deal with body image threats, and ultimately negative body image.

Despite extensive research on body image, relatively little has examined body image coping (Cash & Smolak, 2011). Further, the majority of research on body image coping to date has investigated women only. Research has frequently reported exercise as an effective long-term coping strategy for dealing with negative body image (Bailey et

al., 2014; Kowalski et al., 2006; Lamarche et al., 2012; Sabiston et al., 2007; Smith-Jackson et al., 2011). In fact, Lamarche et al. (2012) and Smith-Jackson et al. (2011) found that exercise was the most commonly reported coping strategy.

Exercise is associated with a number of physical and psychological benefits related to body image (Martin Ginis & Bassett, 2011). Three meta-analyses have shown a positive relationship between exercise and body image, with small to moderate effect sizes, providing substantial evidence that people who exercise more often tend to have a more positive body image compared to those who exercise less often, or not at all (Campbell & Hausenblas, 2009; Hausenblas & Fallon, 2006; Reel et al., 2007).

Further, a number of studies have found that exercise can be helpful for coping with social-evaluative threats. Exercise interventions have been found to lead to reduced psychological (von Haaren et al., 2015) and physiological (Klaperski et al., 2014) reactivity to social-evaluative threats in young adults (Anshel, 1996; Calvo et al., 1996). While these studies primarily involved non-exercisers, other research has found that habitual exercisers also show lower psychological and physiological reactivity to social-evaluative threats compared to infrequent or non-exercisers (Klaperski et al., 2013; Rimmele et al., 2009; Rimmele et al., 2007). Thus, habitual exercise appears to reduce psychological and physiological reactivity to psychosocial stress and may be an effective coping strategy for managing acute social-evaluative body image threats by reducing psychobiological responses.

Weight training, in particular, appears to be a promising intervention for improving men's body image. Both Hausenblas and Fallon (2006) and Reel et al. (2007) found that anaerobic exercise, such as weight training, resulted in greater improvements

in body image than aerobic exercise, such as jogging. One reason for these findings could be that weight training can bring men more in line with the muscular ideal by increasing muscle mass and strength (Hausenblas & Fallon, 2006). Reel et al. (2007) also suggested that body satisfaction in men may be more dependent on muscularity and strength, rather than body weight or aerobic conditioning (Reel et al., 2007). Martin Ginis et al. (2005) suggested that weight training often leads individuals to feel stronger and more toned. This perception may lead to improvements in body image, whether objective physical changes have occurred or not (Martin Ginis et al., 2005). A final reason might be that weight training is accessible, socially encouraged, and does not require men to admit or verbalize their concerns. The conclusions of these studies point to the necessity for more research to investigate the effects of exercise on body image in men, particularly with regards to the importance of weight training as an effective coping strategy (Campbell & Hausenblas, 2009).

Given that social-evaluative body image threats are common and contribute to negative body image, it is important to understand how men respond to, and recover from, these threats and to research effective coping strategies for managing them. Further, to date, no studies have investigated men's behavioural responses to social-evaluative body image threats or how men recover from these threats. Investigating behavioural responses provides important information about the way men feel while they are actually experiencing a social-evaluative body image threat. Behavioural responses are continuous and harder to fake in comparison to self-report measures. Analyzing participants' behavioural responses in addition to their psychological and physiological responses

ultimately helps to provide a more complete picture of men's responses to uncomfortable body image situations.

Additionally, it is important to investigate men's recovery from social-evaluative body image threats since prolonged, elevated levels of shame and cortisol are associated with a number of harmful outcomes (Dickerson, Gruenewald et al., 2004). Previous research found that women responded and recovered relatively quickly from a social-evaluative body image threat (Lamarche et al., 2016); therefore, it is possible that men have a similar response-recovery profile. Developing a better understanding of how men respond to, and recover from, social-evaluative body image threats will help researchers develop effective coping strategies for managing these threats as well as identify those at risk of prolonged, repeated exposure to body image threats. To date, the literature on body image coping is limited, especially regarding men. In the literature that exists, exercise is frequently cited as an effective long-term coping strategy. There is a need to test the efficacy of exercise, particularly weight training, to reduce the acute psychobiological responses to body image threats in men (Campbell & Hausenblas, 2009; Hausenblas & Fallon, 2006; Martin Ginis et al., 2005; Reel et al., 2007).

## **2.2 Purpose**

The purpose of the present study was fourfold: (1) to investigate the psychobiological responses (e.g., body shame, social physique anxiety, body dissatisfaction, and cortisol) to, and (2) recovery from, a social-evaluative body image threat in university men, (3) to examine weight training as a potential moderator of the expected psychobiological responses, and (4) to analyze men's behavioural responses to a social-evaluative body image threat, with particular focus on indicators of shame.

## 2.3 Hypotheses

It was hypothesized that:

1. Post-threat body shame, social physique anxiety, and body dissatisfaction, would be higher among participants in the high-threat condition compared to participants in the low-threat condition but there would no longer be significant differences between groups at the recovery time point.
2. The percent change in cortisol from pre-threat at post-threat and peak response would be significantly greater among participants in the high-threat condition compared to the low-threat condition but percent change in cortisol from baseline at recovery would not be significantly different between conditions.
3. Weight training behaviour would moderate the expected psychobiological responses to a social-evaluative body image threat. Specifically, post-threat body shame, social physique anxiety, body dissatisfaction, and cortisol would be negatively related to weight training behaviour in the high-threat condition, but would be unrelated to weight training behaviour in the low-threat condition.
4. Men in the high-threat condition would exhibit behavioural displays of shame to a greater extent than men in the low-threat condition.

## CHAPTER 3: METHODOLOGY

### 3.1 Participants

Participants for the present study included 73 men between the ages of 17 and 25. Exclusion criteria were varsity athletes, competitive body builders, or having a history of a clinical eating disorder. Individuals from these populations tend to have more extreme body image and physical activity levels compared to the general public (Hausenblas & Fallon, 2006; Hausenblas & Symons Downs, 2001). Individuals who could not read or speak English fluently were also excluded since it was important for participants to comprehend all questionnaires, instructions and manipulations. Lastly, chronic smokers, those who were on certain medications that affect cortisol (e.g., anti-depressants, corticosteroids; Burke, Davis, Otte, & Mohra, 2005), and those with various medical conditions that affect cortisol, such as Cushing's disease (Gold & Chrousos, 1985) were excluded. Participants were asked to refrain from engaging in any physical activity and consuming any food or beverage for one hour before participating in the study as these behaviours may influence cortisol levels.

**3.1.1 Recruitment.** Participants were recruited through: (1) posters placed around Brock University campus and on social media websites, (2) announcements in university lectures, (3) word of mouth, and (4) the Sona Systems research participant pool website. Through our cover story, participants were led to believe that they would be participating in a study designed to investigate hormones, physical characteristics and self-beliefs in college-aged men. Students were able to contact the researchers if they were interested in participating. Once they made contact, inclusion and exclusion criteria were outlined and the letter of invitation was sent to the potential participant via email. If the individual met

participation criteria and wished to participate, a mutually convenient time to meet was set. Participants received a one-hour credit for research participation or \$10.00 as compensation.

**3.1.2 Sample size.** The sample size for the present study was determined using prior research investigating psychobiological responses to a social-evaluative body image threat in men (Ozimok et al., in progress). Previous research produced medium to large effect sizes (body shame  $\eta_p^2 = .10$ ; social physique anxiety  $\eta_p^2 = .15$ ; body dissatisfaction  $\eta_p^2 = .17$ ; cortisol  $\eta_p^2 = .11$ ; Ozimok et al., in progress). Based on these effect sizes with power = .80,  $\alpha = .05$ , approximately 25 men per condition were required; therefore 73 men were recruited. Based on previous research, this number accounted for anticipated attrition due to participant drop-out, non-compliance to study requirements, and complications with cortisol sampling (Ozimok et al., in progress).

### 3.2 Study Design

This study was a pre-post experimental design with a treatment group and a control group. Data was collected using a mixed factorial design. Participants were randomly assigned to one of two conditions: high-threat or low-threat. Measures, including saliva samples and body image questionnaires (see Appendix A for all questionnaires), were completed multiple times throughout the testing session.

### 3.3 Measures

**3.3.1 Demographic Questionnaire.** Participants self-reported the following variables: age, major, ethnicity, sexual orientation, recent stressful events, wake-up time, history of Hepatitis B, history of a clinical eating disorder, smoking status, varsity athlete status, history of anabolic steroid use, and current medications related to cortisol functioning. Participants were also asked if they ate or drank anything or participated in any physical activity within one hour of testing, since these factors can affect cortisol functioning. Lastly, they reported whether they had had anthropometric measures taken in the past.

**3.3.2 International Physical Activity Questionnaire (Short; IPAQ-S; Craig et al., 2003).** The IPAQ-S questionnaire was used to assess self-reported levels of physical activity. Participants reported the number of days they participated in vigorous, moderate or mild activity over the past 7 days. Next, they reported the average amount of time spent engaged in each type of activity per day. Estimated MET energy expenditure values were assigned to each type of activity (i.e., vigorous = 8.0, moderate = 4.0, walking = 3.3). Scoring was based on the assumption that an average individual sleeps for approximately 8 hours per day. All cases where walking, moderate or vigorous activity exceeded 180 minutes per day were recoded to 180 minutes. This allowed a maximum of 21 hours of activity in a week for each category. Total weekly duration of physical activity could not exceed 960 minutes. Cases exceeding 960 minutes of total weekly physical activity were deleted. Next, total moderate and vigorous MET-minutes/week scores were calculated using the IPAQ short formula: (4.0 METs x number of minutes x number of days/week of moderate physical activity; 8.0 METs x number of minutes x



number of days/week of vigorous physical activity). Finally, moderate and vigorous scores were summed together to calculate total number of MET-minutes per week of moderate-vigorous physical activity. The short version of the IPAQ has been shown to be reliable and valid (Craig et al., 2003; Wolin, Heil, Askew, Matthews, & Bennett, 2008).

**3.3.3 Weight Training Behaviour Questionnaire.** Participants completed a measure of weight training behaviour. This measure was designed and created by the researchers since no measure of weight training behaviour previously existed. Participants answered questions related to their weight training behaviour during the past seven days and over the last six months, modelled after the questions on the IPAQ-S (i.e., frequency and duration). They were also asked to report whether there were any interruptions in their weight training during this time, the reason(s) for the interruption(s) and how long they stopped training for. Additional questions related to their current weight training status, type of weight training, reasons for weight training, years of weight training experience, and location of weight training.

**3.3.4 Male Body Attitudes Scale (MBAS; Tylka et al., 2005).** The MBAS was used as a measure of trait body image. The MBAS assesses men's attitudes towards their bodies. Specifically, it measures dissatisfaction and preoccupation with one's body, both globally and in discrete areas. The MBAS is a 24-item questionnaire with three subscales: muscularity, low body fat, and height. For the present study, only the muscularity subscale was used. The muscularity subscale (10 items) assesses satisfaction with muscularity of various body parts. Participants were asked to read and rate the extent to which each statement applied to them on a 6-point scale, ranging from 1 = *never* to 6 =

*always*. The MBAS has been found to be reliable and valid in a sample of college men (Tylka et al., 2005). Internal consistency was deemed adequate ( $\alpha = .88$ ).

**3.3.5 Body Image State Scale (BISS; Cash, Fleming, Alindogan, Steadman, & Whitehead, 2002).** The BISS was used to measure evaluative/affective body image states. The BISS consists of six items that measure the following domains of current body experience: (1) dissatisfaction–satisfaction with overall physical appearance; (2) dissatisfaction–satisfaction with body size and shape; (3) dissatisfaction–satisfaction with weight; (4) feelings of physical attractiveness–unattractiveness; (5) current feelings about one’s looks relative to how one usually feels; and (6) evaluation of one’s appearance compared to how the average person looks. For each item participants were asked to indicate how they felt right at that moment in time on a 9-point scale, ranging from 1 = *extremely satisfied* to 9 = *extremely dissatisfied*. Items were coded so that higher scores represent greater dissatisfaction with one’s body. This measure has shown evidence of reliability and validity in both men and women (Cash et al., 2002). Internal consistency was deemed adequate for all time points ( $\alpha$  ranged from .77 to .86).

**3.3.6 Weight- and Body-Related Shame Scale (WBRSS; Conradt et al., 2007).** The shame subscale of the WBRSS was used to assess body shame. The WBRSS was developed to assess shame and guilt related to the body and weight control. The shame subscale consists of six items rated on a 5-point scale ranging from 0 = *strongly disagree* to 4 = *strongly agree* (e.g., “Right now, I feel ashamed because others can see my body”). This scale has been adapted previously to measure state body shame and has demonstrated adequate reliability in women and men (Bailey, Lamarche, Gammage, & Sullivan, 2016; Cloudt et al., 2014; Lamarche et al., 2014; Ozimok et al., in progress).

The WBRSS has been shown to be a psychometrically sound, reliable and valid instrument for measuring feelings of body shame in men and women with concerns related to weight (Conradt et al., 2007). Internal consistency was deemed adequate for all time points ( $\alpha$  ranged from .84 to .86).

**3.3.7 State Social Physique Anxiety Scale (S-SPAS; Kruisselbrink et al., 2004).** The S-SPAS scale was used to measure state social physique anxiety. The original Social Physique Anxiety Scale (SPAS) was developed by Hart et al. (1989) and included 12 items to measure dispositional social physique anxiety. This scale was reduced to 9 items by Martin, Rejeski, Leary, McAuley, and Bane (1997) and then modified by Kruisselbrink et al. (2004) to measure situational social physique anxiety. The S-SPAS includes nine items that are measured on a 5-point scale, ranging from 1 = *not at all characteristic of me* to 5 = *extremely characteristic of me*. The S-SPAS has shown evidence of reliability and validity in adult men and women (Kruisselbrink et al., 2004; Martin Ginis, Murru, Conlin, & Strong, 2011). Internal consistency was deemed adequate for all time points ( $\alpha$  ranged from .86 to .89).

**3.3.8 Perceived Evaluative Threat (PET; Focht & Hausenblas, 2004; Hart et al., 1989).** The PET was used as a manipulation check to measure each participant's perception of the level of threat in terms of having his body evaluated by others. The PET consists of one item asking participants to rate how threatening they perceived the anthropometric and strength testing to be in terms of having their body evaluated by others, using a 5-point scale, ranging from 0 = *not at all* to 4 = *extremely*.

**3.3.9 Perceptions of Confederates Questionnaire.** Participants in the high-threat condition completed a second post-threat manipulation check where they rated the build

of the other participant (male confederate), on a 5-point scale, ranging from 0 = *not at all my perception of the muscular ideal* to 4 = *my exact perceptions of the muscular ideal*.

They also indicated how attractive they found the female confederate on a 5-point scale, ranging from 0 = *not at all attractive* to 4 = *very attractive*.

**3.3.10 Additional manipulation checks.** In addition to the aforementioned manipulation checks, participants reported whether they ate or drank anything or engaged in any physical activity one hour prior to participation. Participants also reported if they experienced any extremely stressful situations immediately before participating. Furthermore, following participation, participants were asked if they were aware of the true purpose of the study.

**3.3.11 Pride Coding System (Tracy & Robins, 2007).** The Pride Coding System (see Appendix B), which includes codes for both pride- and shame-relevant behaviours, was used to analyze participants' voluntary, nonverbal behaviours throughout the duration of the study. Participants in each condition were videotaped so that their behaviours could be coded after the completion of data collection. Previous work has noted a number of behavioural outcomes associated with shame (Gilbert, 2000; Keltner, 1995; Tangney et al., 1996). This measure was used to complement the data collected through self-report questionnaires.

The Pride Coding System includes 16 codes overall: six shame-relevant codes and 10 pride-relevant codes. There are six codes that apply to the head, six codes for the arms, and four codes for the body. Each code was rated on a scale from 0 = *not at all visible* to 5 = *extreme intensity*. Intensity was determined both by the frequency of a behaviour occurring and the duration of the behaviour. For the present study, each session (and

video recording) lasted approximately 75 minutes. In order to code more accurately, study sessions were divided into five time intervals: pre-threat, anticipation, threat, post-threat, and recovery (Bakeman & Quera, 2011). Time intervals ranged from 10 to 20 minutes in duration. Each code on the Pride Coding System was rated for each of the five time intervals.

Coding occurred after all testing sessions were completed. To ensure trustworthiness of the findings, two researchers analyzed the video recordings independently. The first researcher was the primary student investigator. The second researcher was a research assistant blind to the research question. The two researchers began by coding twenty videos (ten from the high-threat condition and ten from the low-threat condition) that were spread across the data collection period. Inter-rater reliability was calculated. Once the researchers watched and coded each recording, they met to discuss any discrepancies. Discussion continued until the two researchers reached consensus on all ratings for each time point.

### **3.4 Saliva Collection Procedures**

Each participant was asked to provide a saliva sample on five separate occasions over the course of the testing session. Saliva samples were collected using Salivettes specific for cortisol measurement. Each participant was asked to sample his own saliva by placing a piece of sterile synthetic swab into his mouth and letting the saliva absorb into the swab for one minute. The participant then carefully guided the swab into a container using his mouth without touching the edges of the tube with his hands. Next, the participant placed the cap on the container. Once the container was sealed, the participant provided his sample to the primary student researcher. Saliva samples were

stored in a -20°C freezer until analysis. This procedure is commonly used in psycho-stress research (Dickerson & Kemeny, 2004); it is hygienic and poses minimal risk to the participant and researcher.

**3.4.1 Salivary cortisol assay determinations.** Saliva was centrifuged at 3000xg for 15 minutes and only the supernatant was assayed. All enzyme immunoassays were carried out on NUNC Maxisorb plates. Cortisol antibodies (R4866) and corresponding horseradish peroxidase conjugate were obtained from C. Munro of the Clinical Endocrinology Laboratory, University of California, Davis. Steroid standards were taken from Steraloids, Inc. Newport, Rhode Island. First, plates were coated with 50 µl of antibody stock diluted at 1:8500 in a coating buffer (50 mmol/L bicarbonate buffer pH 9.6). Then, plates were sealed and stored for 12–14 hours at 4 °C. A 50 µl wash solution (0.15 mol/L NaCl solution containing 0.5 ml of Tween 20/L) was added to each well to rinse away any unbound antibody, then 50 µl phosphate buffer per well was added. Plates were incubated at room temperature for 2 hours before adding standards, samples, or controls. Two quality control salivary samples at 30% and 70% binding (the low and high ends of the sensitivity range of the standard curve) were prepared. 50 µl cortisol horseradish peroxidase conjugate was added to each well, with 50 µl of standard, sample, or control. Plates remained incubated for 1 hour after plate loading. Plates were then washed with 50µl wash solution and 100µl of a substrate solution of citrate buffer; H<sub>2</sub>O<sub>2</sub> and 2,2'-azino-bis (3- ethylbenzthiazoline-6-sulfonic acid) was added to each well. The plates were covered and incubated while shaking at room temperature for 30–60 min. Next, plates were read with a single filter at 405 nm on the microplate reader (Titertek multiskan MCC/340). Blank absorbances were obtained, standard curves were generated,

a regression line was fit to the sensitive range of the standard curve (typically 40 – 60 % binding), and samples were interpolated into the equation to get a value in pg per well. Each sample was assayed in duplicate and averages were used. Interplate variation (CV) was 6.45% while intraplate variation was 6.51%.

### **3.5 Procedures**

Ethics clearance was granted for the present study (see Appendix C) and all participants provided informed consent prior to participation. Procedures for the present study were largely based on Ozimok et al. (in progress) who manipulated a social-evaluative body image threat using the findings from Dickerson and Kemeny (2004), Lamarche et al. (in progress), and Munroe-Chandler and Gammage (2008). In their meta-analysis, Dickerson and Kemeny (2004) identified three important elements of a social-evaluative threat: a permanent record of performance, the presence of an evaluative audience, and the potential for negative social comparison (i.e., male confederate, normative feedback). Lamarche et al. (in progress), conducted interviews asking men to describe and contextualize uncomfortable body image situations. The preliminary results showed that men's body image is threatened in situations involving social-evaluation (consistent with SSPT), especially with regards to evaluation of muscularity and strength. The gym was frequently reported as a threatening environment (Marquez & McAuley, 2001; Leary, 1995). Other specific contextual factors that can increase the evaluative potential in various settings included being in the presence of muscular, "ideal" men or "attractive" women, and not wearing a shirt (Lamarche et al., in progress). Munroe-Chandler and Gammage (2008) provided additional information about specific aspects of

exercise environments that can evoke social anxiety in men. They found anxiety regularly stemmed from concerns about physical appearance, or appearing weak or unskilled.

Ozimok et al. (in progress) used these findings to manipulate a situation that would threaten men's body image. They found that men exposed to a social-evaluative body image threat experienced greater increases in body shame and cortisol compared to men in the low-threat condition, consistent with SSPT. In the present study, a similar manipulation was used. Additionally, the current study investigated men's voluntary, nonverbal behavioural responses to a social-evaluative body image threat by videotaping participants in each condition and coding their behaviours after all sessions were completed, using the Pride Coding System (Tracy & Robins, 2007).

### **3.6 Testing Procedures**

All testing procedures took place in the Exercise Intervention Laboratory at Brock University (Welch Hall 16). Participants were tested individually between 2:30 p.m. and 7 p.m. to account for the diurnal variations in cortisol (Dickerson et al., 2009; Dickerson & Kemeny, 2004). Figure 1 illustrates the flow of the procedures and an estimated timeline for each condition.

Upon arrival to the lab, participants were asked to sit and provide informed consent as well as the first of five saliva samples (see Saliva Collection Procedures below). The first saliva sample was taken as a baseline measure to examine whether participants followed participation instructions and to assess the effectiveness of our randomization procedures. Next, participants completed the demographic questionnaire, and measures of physical activity (IPAQ-S; Craig et al., 2003) and weight training behaviour, followed by a measure of trait body image (MBAS; Tylka et al., 2005).



Next, participants were asked to complete a series of three state body image questionnaires (i.e., pre-threat) that were presented in a randomized order to avoid order effects. Once they completed all three questionnaires, participants provided a second saliva sample. Next, participants underwent their condition (see Conditions below). Both conditions consisted of an assessment of anthropometric measures and strength (see Anthropometric and Strength measures section below).

Immediately following their condition, participants provided a third saliva sample and completed the same three state body image questionnaires (post-threat), which were presented in a randomized order. This was followed by the first manipulation check, the PET. Once these measures were completed, participants rested quietly for 10 minutes. Participants were asked to sit quietly and refrain from talking, eating, drinking, sleeping, using cell phones, laptops and listening to music. Participants provided a fourth saliva sample following a ten-minute rest period. Next, participants rested for another twenty minutes before providing their fifth and final saliva sample, and completing the same three measures of state body image at the recovery time point. These measures were once again presented in a randomized order. Lastly, participants in the high-threat condition completed a second manipulation check where they were asked to rate the levels of muscularity of the other participant (male confederate) and the level of attractiveness of the female research assistant (female confederate; see Perceptions of Confederates Questionnaire).

Once participants completed the recovery measures and the second manipulation check they were provided with a complete debriefing. The principal student researcher informed participants of the true purpose of the study, the use of deception, and why it

was necessary, as well as described the two conditions involved in the study. Finally, participants were asked to provide final consent since the study involved deception. Participants were also able to request and receive a summary of study results if they desired.

### **3.7 Conditions**

**3.7.1 High-threat condition.** Participants in the high-threat condition underwent testing with the principal student researcher (male), a research assistant, a male confederate (described as another research participant), and a female confederate (described as a research assistant). Thus, there were four people in addition to the participant in the high-threat condition. The male confederate was someone who represented the North American ideal for the male body, which is characterized by a tall, lean and muscular build with broad shoulders, muscular arms and chest muscles, a narrow waist, and well-defined abdominals (McFarland & Petrie, 2012; Pope, Olivardia, Gruber, & Borowiecki, 1998). The female confederate was someone who represented the North American ideal for the female body, described as thin and attractive (Algars et al., 2009). The same confederates were used for all participants in the high-threat condition.

The principal student researcher explained all procedures and answered any questions from the participants. The threat involved a number of anthropometric measurements and a strength test for both the confederate and participant. Participants were also told that they would be provided with normative feedback so that they could see how their results compared with other men their age.

In each session, the confederate, who represented the muscular ideal, was tested first, in front of the participant. All physical measures (biceps, chest and waist

circumference, skinfold measures, height and weight, and hand-grip strength; see Anthropometric and Strength Measures below) were taken and read aloud by the female confederate to the principal student researcher, who helped with the anthropometric measures and recorded the results. Each measure was taken three times to ensure accuracy. Once all measurements were taken, the principal student researcher passed the recorded values to the other research assistant who left the lab for approximately two minutes to “calculate” the body composition scores and norms based on the male confederate’s measurements. When the research assistant returned, (s)he passed the “calculated results” to the female research assistant who read them out loud, so that everyone could hear. The male confederate’s results indicated that he tested in the healthiest range for body mass index (BMI) based on norms for men his age (between 17-25 years), had 8 percent body fat, indicating optimal levels, comparable to elite athletes, and scored in the 90<sup>th</sup> percentile for strength, indicating that he was stronger than more than 90% of men his age.

Next, the participant underwent the same anthropometric and strength measurements using identical procedures. After all measurements were completed, a research assistant left to calculate the participant’s results. During this time, the participants provided a third saliva sample and were asked to complete the next questionnaire package to save time. Once the questionnaires were completed, the participant rested for approximately 10 minutes and then provided a fourth saliva sample to capture the peak cortisol response (Dickerson & Kemeny, 2004). Next, they rested for an additional twenty minutes before providing the fifth saliva sample and completing the

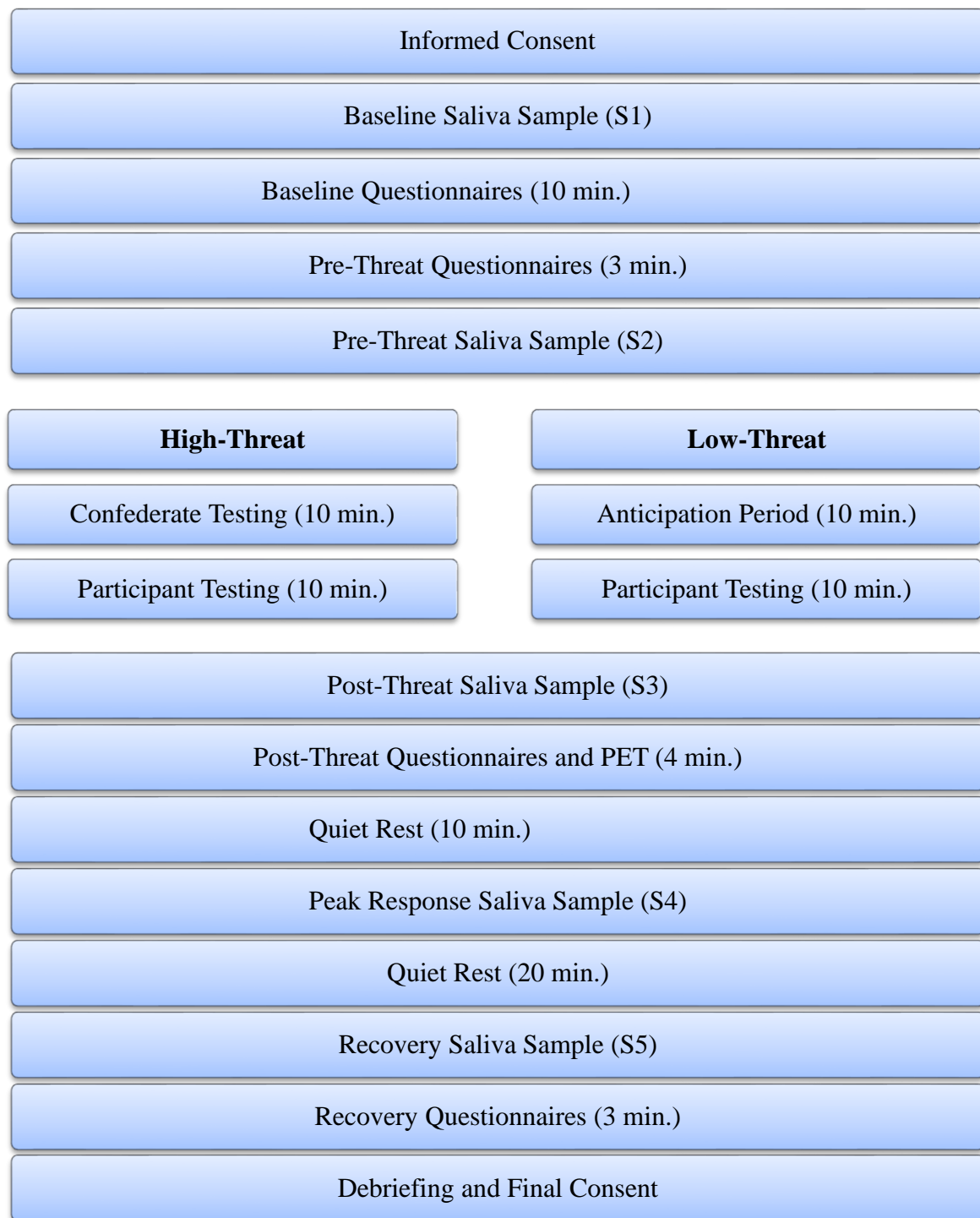
final recovery questionnaire package. All anthropometric and strength results were available for the participant at the end of the session.

Several aspects of the manipulation were designed to increase the intensity of the social-evaluative threat, based on the meta-analysis of factors that heighten the cortisol response to acute laboratory stressors (Dickerson & Kemeny, 2004) as well as qualitative research investigating factors that led to uncomfortable body image situations or increased social anxiety in men (Lamarche et al., in progress; Munroe-Chandler, 2008). The tests selected involved evaluation of muscularity and strength, which are characteristics of importance to young men (Dickerson & Kemeny, 2004; McCabe & Ricciardelli, 2004). Additionally, all measurements were taken without the participant wearing his shirt since men reported that being shirtless was an uncomfortable body image situation for them (Lamarche et al., in progress). Being in the presence of attractive women and/or ideal men has also been reported as a factor that can make men uncomfortable (Lamarche et al., in progress; Munroe-Chandler & Gammage, 2008). Thus, the male and female confederates were included. Furthermore, a video camera was set up to increase the intensity of the threat by creating a permanent record (Dickerson & Kemeny, 2004), and participants were told that this was to ensure that all procedures and measures were performed correctly. To emphasize the presence of the video camera, a research assistant would carry the camera and move it around in close proximity to the participant to get a clear view of the measurements while he was being tested. This reminded the participant that he was being recorded. This recording was also used to code participants' voluntary, nonverbal behaviours using the Pride Coding System after all testing sessions were completed. Lastly, reading the confederate's results out loud, and

telling the participant that he would receive normative feedback on his own scores also enhanced the evaluative component of the threat by increasing the opportunity to make social comparisons (Dickerson & Kemeny, 2004).

**3.7.2 Low-threat condition.** Participants in the low-threat condition rested for ten minutes to account for the time it took for the confederate to be tested in the high-threat condition. This ensured that all questionnaires and saliva samples were completed at the same time in each condition. Next, participants underwent testing in a private setting with the principal student researcher and one male or female research assistant; there were no confederates present. The principal student researcher explained all procedures and answered any questions that participants had. The participant underwent the same anthropometric and strength measurements as those performed in the high-threat condition using the same standardized protocols. However, all measurements were taken with the participant's shirt on. Measures were not read aloud, but instead, were recorded quietly by the research assistant, and no normative feedback was provided. Participants were also videotaped. The video camera was set up in the corner obscured from view and not mentioned until participants were debriefed. Once the participant completed all measurements, he provided a third saliva sample and filled out the post-threat questionnaire package. The participant then rested for ten minutes before providing a fourth saliva sample in order to capture the peak cortisol response (Dickerson & Kemeny, 2004). Next, the participant rested for an additional twenty minutes before providing the fifth saliva sample and completing the final recovery questionnaire package. Anthropometric and strength results were available for the participant at the end of the session.

Thus, both conditions were matched in terms of body image content. Participants in each condition completed the same measures and underwent the same measurements pertaining to body size and strength. However, conditions differed in the amount of social evaluation. In the low-threat condition, social evaluation was minimized by having only two researchers present (i.e., removing the confederates), deemphasizing the video camera, recording the participant's results quietly, and reducing the potential for social comparison by omitting normative feedback.



**Figure 1:** A visual representation of the flow and timing of the procedures. Each session lasted approximately 75 minutes.

### **3.8 Anthropometric and Strength Measures**

Participants underwent a number of anthropometric measurements. These measurements were selected to emphasize the muscularity in the upper body and abdomen, consistent with the male ideal (Cafri & Thompson, 2004). First, flexed biceps, chest, and waist circumference, were taken using a measuring tape. This process was repeated three times. For biceps circumference, participants flexed their biceps while the tape was placed around the peak and recorded to the nearest centimeter. Biceps circumference was taken on each arm. For chest circumference, the tape was placed around the widest part of the chest and recorded to the nearest centimeter. Waist circumference was taken at the top of the iliac crest and recorded to the nearest centimeter (Arder, Janssen, Ross, & Katzmarzyk, 2004; Klipstein-Grobisch, Georg, & Boeing, 1997; Taylor & Behnke, 1961). Flexed biceps and chest circumference are reliable forms of basic anthropometric measures (Klipstein-Grobisch et al., 1997), and waist circumference is a valid method for determining fat distribution, particularly in the abdominal region (Taylor, Jones, Williams, & Goulding, 2000).

Next, body fat percentage was estimated using a two-site skinfold test (Sloan, 1967). Measurement sites included the subscapula and the thigh. The subscapular measure was taken one to two centimeters below the inferior angle of the scapula using a diagonal fold. The thigh measure was taken at the anterior midline of the thigh, midway between the proximal border of the patella (knee) and inguinal crease (hip) using a vertical fold (Bray et al., 1978). Measurement sites were landmarked beforehand to ensure consistency between measurements. Once the measurement site was marked, the tester pinched the skin with the thumb and forefinger roughly half of an inch from the



measurement site. The skin was gently lifted allowing the adipose tissue to separate from the underlying muscle. The calipers were then applied to the lifted skin and adipose tissue, and the tester waited four seconds before reading the score. Each measurement was taken three times. If the difference between the first and second measurement was greater than 1 millimeter, a fourth measurement was taken. The mean value was used for the final score. The following formula was used to calculate body density from the skinfold measures:  $(\text{Body density} = 1.1043 - (0.001327 \times \text{thigh skinfold in mm}) - (0.00131 \times \text{subscapular skinfold in mm}; \text{Sloan, 1967})$ . Body density was used to calculate body fat percentage using the Siri equation:  $\text{Percent fat} = [(495 / \text{Body Density}) - 450]$  (Siri, 1961). Sloan and Shapiro (1972) have shown this method to be reliable for assessing body composition.

A handgrip dynamometer was used to assess handgrip strength. Each participant was asked to stand with the dynamometer in the hand to be tested, with the arm raised to shoulder height at the side of the body. The arm was held out straight so that it formed a right angle with the body at the shoulder joint. Participants were asked to take a deep breath, exhale and squeeze the dynamometer with maximum force. They were allowed to lower the dynamometer slowly towards their leg, without contacting it. This procedure was repeated two times for each hand, alternating sides, and the highest score for each hand was summed and divided by two to get their final score (Mathiowetz, Weber, Volland, & Kashman, 1984). This method for measuring strength has shown high reliability and validity (Bellace, Healy, Besser, Byron, & Hohman, 2000).

Height and weight were also measured without participants' shoes and socks. Height was measured using a stadiometer. Participants were asked to stand tall with their

feet flat and heels against the back of the stadiometer. They were instructed to take a deep breath and exhale as the moveable arm was lowered until it made contact with the top of their heads. This value was recorded to the nearest millimeter (Lund, 1995). Weight was measured using a standard scale. Participants were asked to step onto the scale and stand still. This value was recorded to the nearest tenth of a kilogram. Participants' values for height and weight were used to calculate BMI.

### **3.9 Data Entry and Analysis**

All data was analyzed using SPSS version 20.0.

### **3.10 Treatment of Missing and Implausible Values**

The data set was screened visually for missing data. Less than 5% of the data was missing for the entire data set and was random; therefore, missing items were replaced by the series mean (Field, 2009). Frequencies were calculated to look for implausible values. Any data that was entered incorrectly was corrected.

### **3.11 Subscale Recoding and Scoring**

Questionnaires were scored and individual items were reverse coded where appropriate. In addition, Cronbach's alpha was calculated where appropriate as an indicator of internal consistency reliability.

**3.11.1 BMI.** For each participant, BMI was calculated by dividing weight (kg) by height squared ( $m^2$ ).

**3.11.2 IPAQ-S (Craig et al., 2003).** IPAQ guidelines were used to score the IPAQ-S.

**3.11.3 Weight Training Behaviour Questionnaire.** The first question on the weight training behaviour questionnaire was used to determine participants average amount of time spent weight training per week over the last six months by multiplying days per week by duration of workout session.

**3.11.4 MBAS (Tylka et al., 2005).** Mean scores were calculated so that higher scores reflected a greater desire for muscularity.

**3.11.5 WBRSS (Conradt et al., 2007).** A mean score for state body shame was calculated for each participant pre-threat, post-threat, and at recovery. Higher scores reflected greater body shame.

**3.11.6 S-SPAS (Kruisselbrink et al., 2004).** A mean score was calculated for each participant pre-threat, post-threat, and at recovery. Higher scores reflected greater social physique anxiety.

**3.11.7 BISS (Cash et al., 2002).** A mean scored was calculated for each participant pre-threat, post-threat, and at recovery so that higher scores represented greater body dissatisfaction.

**3.11.8 Cortisol.** Given that changes in cortisol from pre- to post-threat were of interest, and pre-threat levels could impact subsequent levels, an additional variable (percent change in cortisol) was calculated. This method is consistent with previous research (van Anders, Hamilton, Schmidt, & Watson, 2007). Percent change in cortisol was calculated by subtracting participants' pre-threat cortisol from post-threat cortisol and dividing this change in cortisol by pre-threat cortisol (and then multiplying by 100).

This provided a measure of the percent change in cortisol referenced to pre-threat cortisol levels.

### **3.12 Descriptive Statistics and Correlations**

**3.12.1 Means (*M*) and standard deviations (*SD*) by group.** All  $M_s$  and  $SD_s$  were calculated for each time point, for each variable used throughout the study (i.e., all demographic variables, IPAQ-S, MBAS subscales, BISS, WBRSS, S-SPAS, PET, perceptions of confederates, and cortisol).

**3.12.2 Correlations by group.** A correlation analysis was conducted to determine if any relationships existed between variables.

### **3.13 Data Screening**

**3.13.1 Univariate outliers.** A univariate outlier is described as any value that is greater or less than 3 [ $SD$ ] from the mean of an individual variable. Z-scores were calculated to identify potential outliers. Z-scores greater than  $|3.29|$  were flagged as potential outliers. All univariate outliers were changed to the next highest score for that variable (Field, 2009).

**3.13.2 Multivariate outliers.** Multivariate outliers were also investigated by calculating Mahalanobis' distance for each participant. Potential outliers were evaluated using the  $\chi^2$  distribution, with the degrees of freedom equal to the number of variables of interest ( $n = 5$ ) at  $p < .001$  for psychological variables and ( $n = 7$ ) at  $p < .001$  for cortisol. Multivariate normality was assumed when none of the MAH values were above the critical values of 20.52 and 24.32 respectively.

### 3.14 Testing of Assumptions

**3.14.1 Univariate normal distribution.** For each measure the assumption of a univariate normal distribution was investigated. Mean, median, and mode values were calculated and compared to examine if these values were similar. Skewness and kurtosis values were checked to examine if they were less than  $|3|$ . Data was also plotted on a histogram to examine symmetrical distribution, characterized by a bell-shaped curve. If normal distribution was violated, data was transformed accordingly so that it was normally distributed (Field, 2009).

**3.14.2 Independent random sampling.** Participants were recruited through posters and announcements in university lectures. This assumption was violated since sampling depended on volunteer participants. Consequently, selection was not random.

**3.14.3 Equal sample sizes among groups.** Each participant was randomly assigned to one of the two conditions to ensure approximately equal sample sizes.

**3.14.4 Linearity.** The variables measured in the study were paired and plotted on scatterplots to examine whether a linear relationship existed between variables.

**3.14.5 Absence of multicollinearity.** Correlations between variables were examined to ensure that variables were not redundant. Absence of multicollinearity was assumed if all Pearson's Correlation ( $r$ ) values were below .90 (Field, 2009).

**3.14.6 Homogeneity of variance.** Levene's test was used to test the null hypothesis that the variances between the two groups were equal. Homogeneity of variance was assumed if the Levene's test was non-significant ( $p > .05$ ).

**3.14.7 Homogeneity of regression slopes.** This assumption was tested to ensure that the relationship between the covariate and the dependent variable was constant across conditions. Homogeneity of regression slopes was assumed if interaction terms were non-significant ( $p > 0.05$ ).

### **3.15 Manipulation Checks**

**3.15.1 Group equivalence.** A series of independent sample *t*-tests was conducted for demographic, anthropometric, strength, trait body image, physical activity, weight training behaviour and pre-threat state body image measures between groups to examine between group differences.

**3.15.2 PET.** An independent sample *t*-test was conducted to examine whether participants in the high-threat condition found the manipulation more threatening than participants in the low-threat condition.

**3.15.3 Perceptions of confederates.** In the high-threat condition, means were calculated and visually inspected to examine whether participants perceived the male and female confederates to closely resemble the ideals according to North American standards.

### **3.16 Hypothesis Testing**

Significant correlations between outcome variables and demographic, anthropometric, strength, MBAS and/or IPAQ measures, were used as covariates.

**Hypothesis 1.** To test the hypothesis that post-threat body shame, social physique anxiety, and body dissatisfaction would be higher among participants in the high-threat

condition compared to participants in the low-threat condition, and that there would no longer be significant differences between conditions at the recovery time point, three repeated measures analyses of covariance (RM ANCOVA) were conducted. Condition was the independent variable. Post threat and recovery psychological measures were the dependent variables. The covariates were pre-threat psychological measures, body fat percentage and trait body image. For significant results, six separate analyses of covariance (ANCOVA) were conducted for the follow-up analyses. Condition (e.g., high-threat, low-threat) was treated as the independent variable. Post-threat and recovery body shame, social physique anxiety, and body dissatisfaction were the dependent variables with the corresponding pre-threat measure as the covariate in each analysis, respectively.

**Hypothesis 2.** To test the hypothesis that post-threat and peak response percent change in cortisol would be significantly higher in the high-threat condition compared to the low-threat condition but percent change in cortisol from baseline at the recovery time point would not be significantly different between conditions, three separate ANCOVAs were conducted. Condition (e.g., high-threat, low-threat) was treated as the independent variable. Post-threat, peak response, and recovery percent change in cortisol were the dependent variables, with trait body image, body fat percentage and strength as the covariates.

**Hypothesis 3.** To test the hypothesis that weight training behaviour would moderate the relationship between condition and the expected psychobiological response to a social-evaluative body image threat, a hierarchical multiple regression analysis was conducted. A moderator is a variable that affects the direction and/or strength of the relationship between an independent variable and dependent variable (Baron & Kenny,

1986). A significant interaction in a hierarchical multiple regression is used to test the dependency of one variable on the level of another variable (Frazier, Tix, & Barron, 2004).

Before conducting the regression analysis, the categorical predictor variable, condition, was dummy-coded to correspond with its number of levels. Since there were two conditions, the number 1 represented the high-threat condition and 0 represented the low-threat condition. The continuous variable, habitual weight training, was zero-centered to reduce the multicollinearity between the predictor variable and interaction term (Baron & Kenny, 1986). The data was centered by subtracting the sample mean from all cases of the continuous variable (weight training behaviour) to get a new mean of 0. Next, a new variable was created to represent the interaction between condition and habitual weight training by multiplying the values together.

In the multiple hierarchical regression analyses, the dependent variable was the psychobiological responses. Thus, a total of five hierarchical regressions were run, one for each variable (post-threat body shame, social physique anxiety, body dissatisfaction, cortisol, and peak response cortisol). Variables were entered into the regression in the following order: first, condition was entered to examine the main effect of condition on the psychobiological responses. Second, habitual weight training was entered to test for its main effect. Third, the interaction between condition and habitual weight training (condition x habitual weight training) was entered to test the hypothesis that weight training moderates the relationship between condition and psychobiological responses. Aiken and West (1991) and Frazier et al. (2004), suggest that if an interaction term is



non-significant and there is not a strong theoretical rationale for including the interaction term, then the model including only the main effects should be interpreted.

**Hypothesis 4.** To test the hypothesis that men in the high-threat condition would exhibit behavioural displays of shame to a greater extent than men in the low-threat condition, participants' behaviours were coded using the Pride Coding System (Tracy & Robins, 2007). Two independent samples *t*-tests were conducted to compare overall shame- and pride-relevant behaviours between conditions. Additionally, a series of sixteen independent samples *t*-tests was conducted to compare differences between conditions for each code individually.

## CHAPTER 4: RESULTS

### 4.1 Treatment of Missing Data and Implausible Values

Data from all 73 participants was entered into SPSS version 20.0 and visually screened for missing and implausible values. No implausible values were noted. One participant from the high social-evaluative threat condition withdrew from the study and therefore was deleted from analysis. Participants who did not fill out particular a questionnaire ( $n = 2$ ) were omitted from that particular analysis. Overall, less than 5% of the data were missing with no consistent pattern; therefore, missing values were replaced with the condition series mean (Tabachnick & Fidell, 2007).

### 4.2 Data Screening

**4.2.1 Univariate outliers.** Univariate outliers for continuous variables, including pre-threat, post-threat, and recovery body shame, body dissatisfaction, and social physique anxiety, body fat percentage, BMI, IPAQ, WTB, MBAS muscularity subscale, as well as cortisol at each time point, were checked using standardized scores (z-scores). Two participants from the low-threat condition were identified as potential outliers for pre, post, and recovery WBRSS scores. Upon further inspection, these participants had abnormally high scores prior to undergoing the manipulation and therefore were deleted from the sample. One participant from the low-threat condition was flagged as a potential outlier for body fat percentage and BMI. Upon further inspection, his body fat percentage was 40% and his BMI was 38.7, classifying him as morbidly obese. This participant was deleted because he was not representative of the sample. After removing these participants and recalculating z-scores, three additional potential outliers were flagged:

one for post-threat body shame, one for post-threat body dissatisfaction, and one for recovery social physique anxiety. Each outlier was replaced with the next highest score for each variable respectively (Field, 2009).

Five potential outliers were flagged for cortisol: two participants, one from the low-threat condition and one from the high-threat condition, for the first saliva sample, one participant from the low-threat condition for the second saliva sample, one participant from the high-threat condition for the fourth saliva sample, and one participant from the high-threat condition for the fifth saliva sample. Each outlier was replaced with the next highest score for each saliva sample respectively (Field, 2009). No additional outliers were identified.

**4.2.2 Multivariate outliers.** To check for multivariate outliers, Mahalanobis' distance was calculated for each case. Potential outliers were evaluated using the  $\chi^2$  distribution, with the degrees of freedom equal to the number of variables of interest ( $n = 5$ ) at  $p < .001$  for psychological variables and ( $n = 7$ ) at  $p < .001$  for cortisol. All values of Mahalanobis' distance were less than the critical values of 20.52 and 24.32 respectively; therefore no multivariate outliers were identified. After data screening was completed, there were 35 participants in the low-threat condition and 34 in the high-threat condition.

### 4.3 Assumptions

**4.3.1 Univariate normal distribution: Skewness and kurtosis.** Both skewness and kurtosis were calculated for all variables to determine whether any values fell outside the range of -3 to +3 (Field, 2009). All values fell within this range, indicating no evidence of abnormal skewness or kurtosis. Thus, the assumption of normality was met.

**4.3.2 Independent random sampling.** The assumption of independent random sampling was violated since participation was volunteer-based.

**4.3.3 Equal sample sizes among groups.** Participants were randomly assigned to either a high- or low-threat condition. After data collection and data screening were completed, groups were nearly equal in size with 35 participants in the low-threat condition and 34 participants in the high-threat condition.

**4.3.4 Linearity.** The assumption of linearity was assessed by visually inspecting bivariate scatterplots for all possible combinations of variables (Tabachnick & Fidell, 2007). Linearity is assumed when two variables display a straight-line relationship. No evidence of a non-linear relationship was found for any of the paired variables. Thus, the assumption of linearity was met.

**4.3.5 Absence of multicollinearity.** Pearson's bivariate correlations were examined between each variable to determine whether any correlation ( $r$ ) values were above .9. As expected, post-threat and recovery shame scores were correlated at .91. Post-threat and recovery social physique anxiety scores were correlated at .92. Since the  $r$  values for these variables were only slightly above .9, they were not removed from analysis.

**4.3.6 Homogeneity of variance.** To assess whether the variance between groups was approximately equal for physical activity, weight training behaviour, and each dependent variable, Levine's statistics were calculated. All tests were non-significant ( $p > .05$ ) with the exception of post-threat body shame scores. However, Levine's test is extremely conservative; therefore, homogeneity of variance was assessed with  $F_{\max}$  in conjunction with sample-size ratios. Given that sample sizes were relatively equal (34

participants in the high-threat condition and 35 participants in the low-threat condition), an  $F_{\max}$  as high as 10 was acceptable (Tabachnick & Fidell, 2007). The  $F_{\max}$  was calculated for post-threat shame scores by dividing the higher variance in the high-threat group by the lower variance in the low-threat group. The calculated  $F_{\max}$  was 2.55. Therefore, the assumption of homogeneity of variance was met.

**4.3.7 Homogeneity of regression slopes.** This assumption was tested for each dependent variable. All interaction terms were non-significant ( $p > 0.05$ ); therefore, this assumption was met.

## 4.4 Manipulation Checks

**4.4.1 Group equivalence.** A series of independent sample  $t$ -tests were conducted for demographic, anthropometric, strength, trait body image, physical activity, weight training behaviour, pre-threat state body image measures, and baseline cortisol to examine any between group differences (see Table 1). Significant differences between conditions existed for age, body fat percentage, BMI, and height. Significant differences also existed for pre-threat body dissatisfaction and pre-threat social physique anxiety. Thus, anthropometric and pre-threat state body image measures were entered as covariates in each analysis respectively, to account for between group differences. No other significant differences existed between conditions.

**4.4.2 PET.** To determine whether participants in the high-threat condition found the manipulation to be more threatening than participants in the low-threat condition, an independent samples  $t$ -test was conducted. Results showed that participants in the high-threat condition ( $M = 1.21$ ,  $SD = .91$ ) found the manipulation significantly more

**Table 1***Descriptive Statistics by Condition*

	High-Threat	Low-Threat
<u>Variable</u>	<u>M (SD)</u>	<u>M (SD)</u>
Age	20.29 (1.85)*	21.28 (1.72)
Body Fat Percentage	14.46 (6.87)*	11.20 (3.70)
BMI	26.03 (3.62)*	24.48 (2.63)
Height	1.76 (.06)*	1.80 (.05)
Moderate and Vigorous PA	2327.06 (1731.80)	2534.86 (1667.21)
Weight Training Behaviour	207.57 (206.77)	284.14 (200.45)
MBAS Muscularity	3.33 (1.02)	3.49 (.99)
Pre-Threat Body Shame	.83 (.72)	.59 (.61)
Pre-Threat BD	4.30 (1.24)*	3.65 (1.01)
Pre-Threat SPA	2.71 (.81)**	2.17 (.59)
S1: Baseline Cortisol	1.98 (1.27)	2.19 (1.20)

*Note.* BMI = body mass index (18.5-24.9 is considered normal); Moderate and Vigorous PA = moderate and vigorous physical activity (MET-minutes/week); Weight training behaviour refers to average amount of time spent weight training per week in last six months (minutes/week); MBAS Muscularity= Male Body Attitudes Scale muscularity subscale, ranges from 1-6 (greater values represent more muscularity concerns); Body shame ranges from 0-4 (greater values represent more body shame); BD = body dissatisfaction, ranges from 1-9 (greater values represent more body dissatisfaction); SPA = social physique anxiety, ranges from 1-5 (greater values represent more social physique anxiety); Baseline cortisol (ng/ml) was measured approximately five minutes after arrival.

\*  $p < .05$ , \*\*  $p < .01$

threatening than participants in the low-threat condition ( $M = .26$ ,  $SD = .56$ ),  $t_{(67)} = -5.22$ ,  $p < .001$ .

**4.4.3 Perceptions of confederates.** Mean scores were calculated to determine how closely participants in the high-threat condition perceived the male and female confederates to align with the cultural ideals. Participants rated the male confederate  $M = 3.17$  ( $SD = .80$ ) out of 4 for resemblance to the muscular ideal. Participants rated the female confederate  $M = 3.07$  ( $SD = .88$ ) out of 4 for attractiveness. Thus, both the male and female confederates represented the cultural ideals.

In addition to the aforementioned manipulation checks, all participants reported following participation instructions (no eating, drinking or physical activity for one hour prior to participation) and no participants reported experiencing any extremely stressful situations immediately before participating. These self-report responses were supported as there were no significant differences between conditions for baseline cortisol levels, and no individual values were unusual. Moreover, no participants reported knowing the true purpose of the study prior to participation after completion of their sessions.

#### **4.5 Descriptive Statistics and Correlations**

Descriptive statistics were calculated for both the high-threat and low-threat condition for each psychological variable (see Table 2) and cortisol (see Table 3). Prior to hypothesis testing, correlations were conducted to see whether there were any relationships between outcome variables and potential covariates (see Table 4). Age was correlated with several post-threat and recovery body image measures in the high-threat condition. The muscularity subscale of the MBAS was correlated with several post-threat and recovery body image measures in both conditions. Strength was correlated with post-threat, peak response, and recovery cortisol in the high-threat condition only. BMI was correlated with recovery body dissatisfaction in the low-threat condition only. The IPAQ and WTB questionnaire were both correlated with post-threat body shame, recovery body shame, and recovery social physique anxiety in the low-threat condition. Shame behaviours (based on the Pride Coding System) were correlated with all psychological variables in the high-threat condition while pride behaviours were not. The muscularity subscale of the MBAS, body fat percentage, and pre-threat scores were used as covariates

in each analysis respectively. Strength was used as a covariate in the cortisol analyses.

Age was not used as a covariate since all participants were between 17 and 25 years old.

**Table 2**

*Means and Standard Deviations for Psychological Variables by Condition*

Variable	High-Threat		Low-Threat	
	<i>M (SD)</i>	<i>EMM</i>	<i>M (SD)</i>	<i>EMM</i>
Post BS	.95 (.79)*	.88	.50 (.50)	.56
Post SPA	2.84 (.82)**	2.74	2.13 (.58)	2.22
Post BD	4.97 (1.50)**	4.74	3.71 (.99)	3.94
Recovery BS	.71 (.74)	.64	.41 (.51)	.48
Recovery SPA	2.56 (.77)	2.45	2.04 (.58)	2.15
Recovery BD	4.44 (1.32)	4.20	3.86 (1.07)	4.09

*Note.* EMM = estimated marginal mean; BS = body shame, ranges from 0-4 (greater values represent more body shame); SPA = social physique anxiety, ranges from 1-5 (greater values represent more social physique anxiety); BD = body dissatisfaction, ranges from 1-9 (greater values represent more body dissatisfaction).

\*  $p < .05$ , \*\*  $p < .01$

**Table 3**

*Means and Standard Deviations for Cortisol and Percent Change in Cortisol by Condition*

Variable	High-Threat		Low-Threat	
	<i>M (SD)</i>	<i>EMM</i>	<i>M (SD)</i>	<i>EMM</i>
S2: Pre-Threat	1.74 (.90)	1.77	2.20 (.86)	2.17
S3: Post-Threat	2.07 (1.13)	2.20	1.84 (.95)	1.72
S4: Peak	2.24 (1.11)	2.33	2.14 (1.08)	2.05
S5: Recovery	1.99 (1.11)	2.07	1.88 (.96)	1.80
S3: % Change	30.31 (58.82)*		-9.26 (51.90)	
S4: % Change	58.95 (115.60)*		2.22 (47.71)	
S5: % Change	34.02 (80.43)		-2.29 (67.90)	

*Note.* EMM = estimated marginal mean; Cortisol (ng/ml) was measured through saliva samples that were provided by participants at five time points. S2 was provided immediately before the onset of the threat (approximately 20 minutes after arrival); S3 was provided immediately post-threat (approximately 20 minutes after the onset of the threat); S4 was provided approximately 30 minutes after the onset of the threat; S5 was provided after a quiet rest period approximately 50 minutes after the onset of the threat and 30 min. after the termination of the threat. % Change = the percent change in cortisol from pre-threat (S2) levels.

\*  $p < .05$ , \*\*  $p < .01$



**Table 4***Correlations Between Participant Characteristics and Dependent Variables*

High-Threat Condition									
<u>Variable</u>	<u>Post Shame</u>	<u>Post SPA</u>	<u>Post BD</u>	<u>Recovery Shame</u>	<u>Recovery SPA</u>	<u>Recovery BD</u>	<u>Post Cortisol</u>	<u>Peak Cortisol</u>	<u>Recovery Cortisol</u>
Age	-.51**	-.41*	-.38*	-.40*	-.40*	-.23	.07	.20	-.02
BF %	.16	-.06	.17	.17	-.01	.22	-.11	-.01	-.07
BMI	-.13	.13	-.09	-.12	-.18	-.08	-.09	.00	-.13
IPAQ	-.25	.08	-.18	-.23	-.09	-.27	.10	.07	.10
WTB	-.19	.04	-.17	-.23	-.15	-.25	.02	-.10	-.10
MBAS	.38*	.59**	.56**	.48**	.61**	.51**	-.32	-.11	-.20
Strength	-.34	.03	-.26	-.24	-.01	-.30	.43*	.60**	.50**
Shame Codes	.36*	.42*	.37*	.41*	.46**	.40*	-.19	-.08	-.13
Low-Threat Condition									
<u>Variable</u>	<u>Post Shame</u>	<u>Post SPA</u>	<u>Post BD</u>	<u>Recovery Shame</u>	<u>Recovery SPA</u>	<u>Recovery BD</u>	<u>Post Cortisol</u>	<u>Peak Cortisol</u>	<u>Recovery Cortisol</u>
Age	-.20	-.25	-.19	-.16	-.20	-.07	-.20	.04	-.09
BF %	.18	.11	.00	.16	.14	-.02	.03	-.07	-.22
BMI	-.18	-.15	-.23	-.20	-.09	-.35*	-.02	.02	-.07
IPAQ	-.43**	-.31	-.27	-.40*	-.35*	-.25	-.18	-.01	.03
WTB	-.54**	-.27	-.33	-.54**	-.37*	-.28	-.14	-.11	.07
MBAS	.27	.32	.39*	.24	.33	.36*	-.05	-.13	-.32
Strength	-.26	.00	-.29	-.23	-.02	-.23	.16	.11	.15
Shame Codes	-.05	.24	.01	.05	.30	.21	-.01	.20	-.13

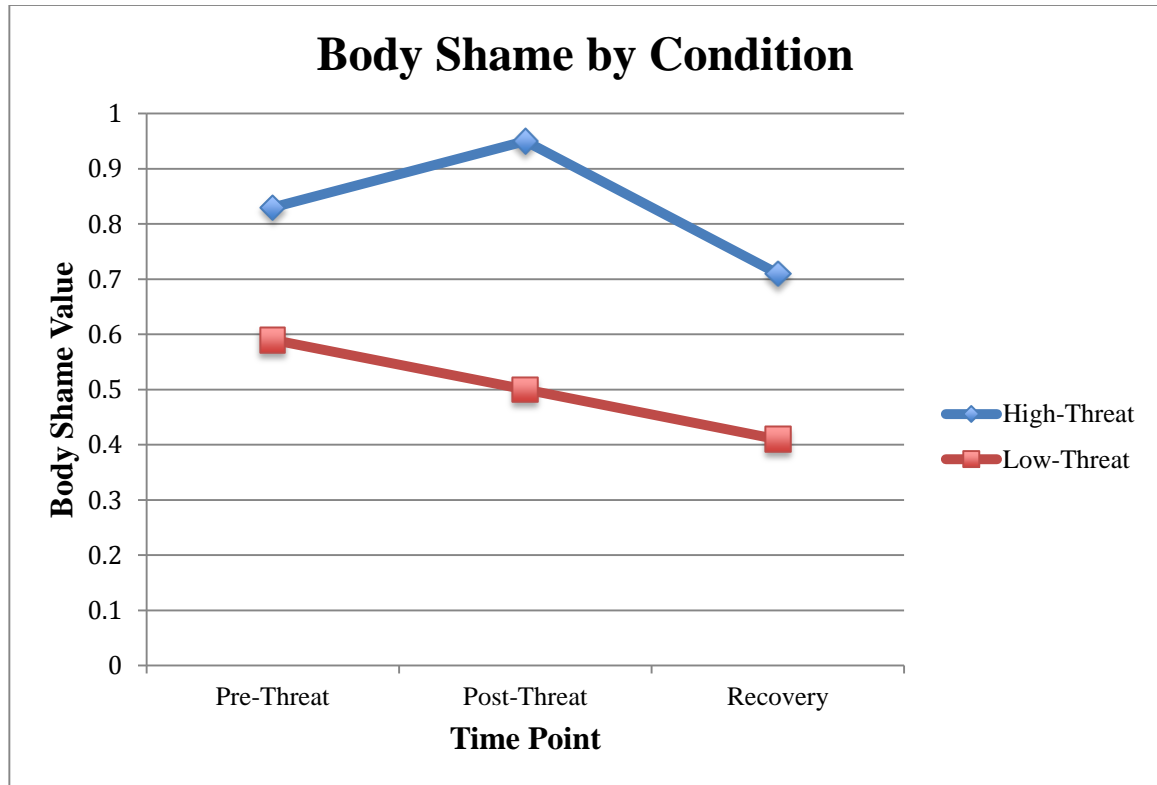
*Note.* Shame = body shame; SPA = social physique anxiety; BD = body dissatisfaction; BF % = body fat percentage; BMI = body mass index; IPAQ = moderate and vigorous physical activity; WTB = average time spent weight training per week in the last six months (minutes/week); MBAS = Male Body Attitudes Scale muscularity subscale; Strength = handgrip strength.

\*  $p < .05$ , \*\*  $p < .01$

## 4.6 Hypothesis Testing

**4.6.1 Research Question #1.** Three RM ANCOVAs were conducted to test the first hypothesis that post-threat psychological measures would be higher in the high-threat condition compared to the low-threat condition and there would no longer be significant differences between conditions at the recovery time point. The independent variable was condition. Post-threat and recovery psychological measures were the dependent variables with pre-threat psychological variables, trait body image, and body fat percentage as the covariates. A series of ANCOVAs were conducted as the follow-up analyses to determine between group differences at the post-threat and recovery time points. Trait body image (MBAS muscularity subscale), body fat percentage and pre-threat psychological measures were entered as covariates in each analysis respectively. Condition served as the independent variable. Post-threat and recovery psychological responses served as the dependent variables in each analysis respectively.

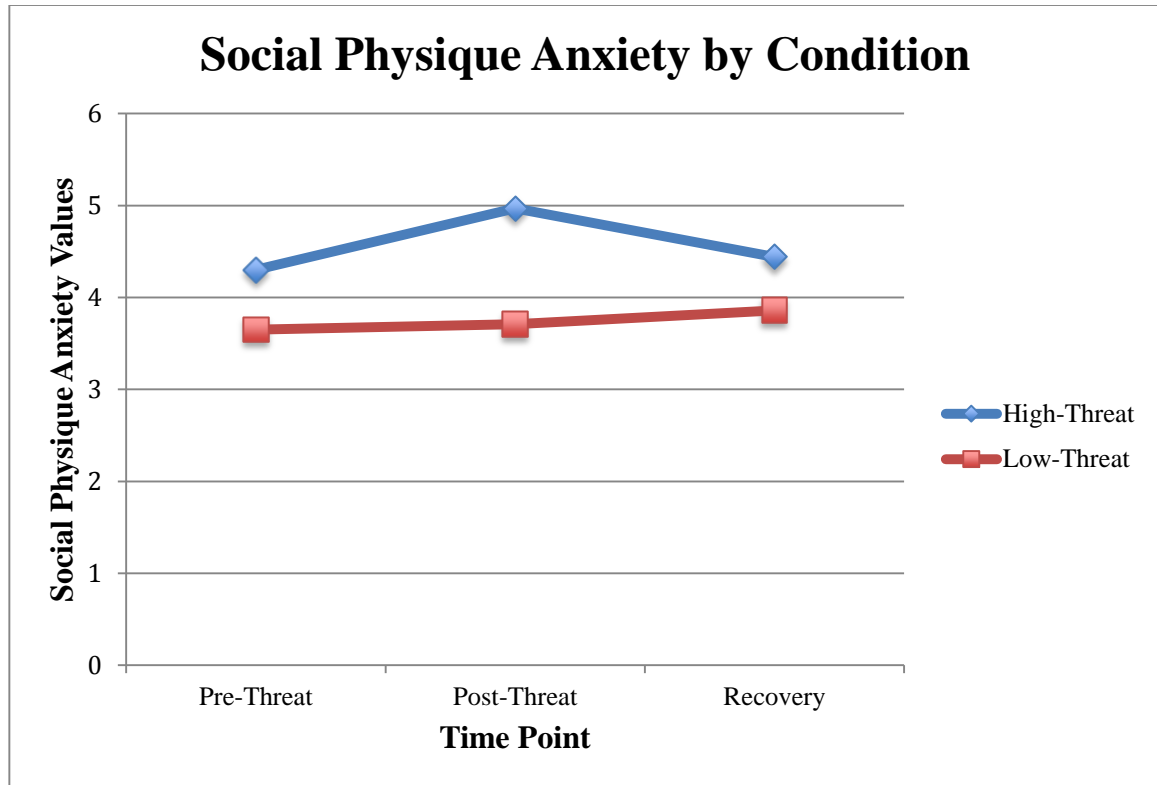
**Body shame.** There was a significant effect of time by condition,  $F_{(1,64)} = 4.28, p < .04, \eta_p^2 = .06$ . Two ANCOVAs were conducted as the follow-up analyses. For post-threat body shame, pre-threat body shame was the only significant covariate,  $F_{(1,64)} = 36.47, p < .001, \eta_p^2 = .36$ . There was a significant effect of condition on post-threat body shame after controlling for the effect of pre-threat body shame, body fat percentage, and trait body image,  $F_{(1,64)} = 6.01, p = .017, \eta_p^2 = .09$ . Participants in the high-threat condition reported significantly greater levels of post-threat body shame compared to those in the low-threat condition (see Table 2 and Figure 2).  $41.09, p < .001, \eta_p^2 = .39$ .



**Figure 2:** Body Shame by Condition

There was no significant effect of condition on recovery body shame after controlling for the effect of pre-threat body shame, body fat percentage, and trait body image,  $F_{(1,64)} = 1.97, p = .166, \eta_p^2 = .03$ . Thus, there were no significant differences for levels of recovery body shame between the high-threat condition and the low-threat condition (see Table 2 and Figure 2).

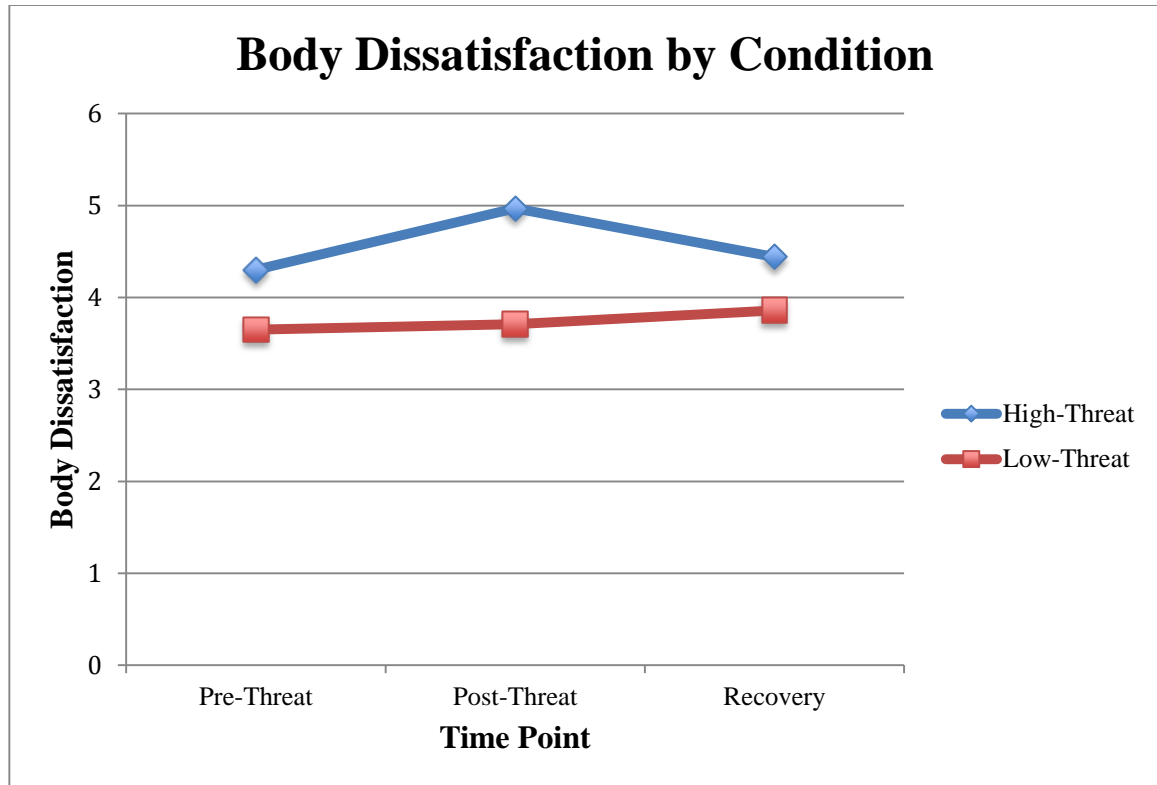
**Social physique anxiety.** There was a significant effect of time by condition,  $F_{(1,64)} = 5.11, p < .03, \eta_p^2 = .08$ . Two ANCOVAs were conducted as the follow-up analyses. For post-threat social-physique anxiety, pre-threat social physique anxiety was the only significant covariate,  $F_{(1,63)} = 13.77, p < .001, \eta_p^2 = .18$ . There was a significant effect of condition on post-threat social physique anxiety after controlling for the effect of pre-threat social physique anxiety, body fat percentage, and trait body image,  $F_{(1,63)} =$



**Figure 3:** Social Physique Anxiety by Condition

10.09,  $p = .002$ ,  $\eta_p^2 = .14$ . Participants in the high-threat condition reported significantly greater levels of post-threat social physique anxiety compared to those in the low-threat condition (see Table 2 and Figure 3).

For recovery social physique anxiety, pre-threat social physique anxiety was the only significant covariate,  $F_{(1,64)} = 16.86$ ,  $p = .000$ ,  $\eta_p^2 = .21$ . There was no significant effect of condition on recovery social physique anxiety after controlling for the effect of pre-threat social physique anxiety, body fat percentage, and trait body image,  $F_{(1,64)} = 3.99$ ,  $p = .051$ ,  $\eta_p^2 = .06$ . Thus, there were no significant differences for levels of recovery social physique anxiety between the high-threat condition and the low-threat condition (see Table 2 and Figure 3).



**Figure 4:** Body Dissatisfaction by Condition

**Body dissatisfaction.** There was a significant effect of time by condition,  $F_{(1,64)} = 14.37, p < .001, \eta_p^2 = .18$ . Two ANCOVAs were conducted as the follow-up analyses. For post-threat body dissatisfaction, pre-threat body dissatisfaction was the only significant covariate,  $F_{(1,64)} = 45.30, p < .001, \eta_p^2 = .41$ . There was a significant effect of condition on post-threat body dissatisfaction after controlling for the effect of pre-threat body dissatisfaction, body fat percentage, and trait body image,  $F_{(1,64)} = 12.59, p = .001, \eta_p^2 = .16$ . Participants in the high-threat condition reported significantly greater levels of post-threat body dissatisfaction compared to those in the low-threat condition (see Table 2 and Figure 4).

For recovery body dissatisfaction, pre-threat body dissatisfaction was the only significant covariate,  $F_{(1,64)} = 46.67, p = .000, \eta_p^2 = .42$ . There was no significant effect

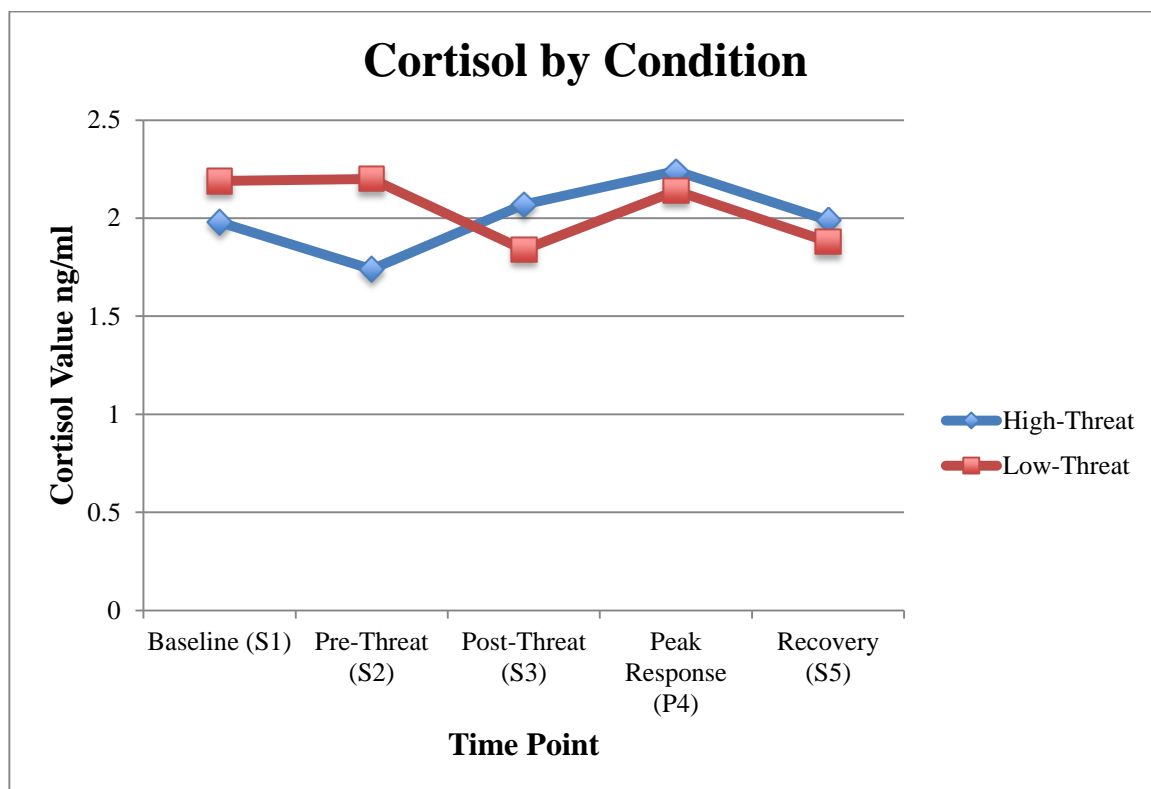
of condition on recovery body dissatisfaction after controlling for the effect of pre-threat body dissatisfaction, body fat percentage, and trait body image,  $F_{(1,64)} = .26, p = .616, \eta_p^2 = .004$ . Thus, there were no significant differences for levels of recovery body dissatisfaction between the high-threat condition and the low-threat condition (see Table 2 and Figure 4).

**4.6.2 Research Question #2.** Three separate ANCOVAs were conducted to test the second hypothesis that post-threat and peak response percent change in cortisol from pre-threat would be higher among participants in the high-threat condition compared to the low-threat condition but percent change in cortisol from baseline at recovery would not be significantly different between conditions. Trait body image (MBAS muscularity subscale), body fat percentage and handgrip strength were entered as covariates in each analysis. Condition served as the independent variable and post-threat, peak response, and recovery percent change in cortisol served as the dependent variables in each analysis respectively.

**Cortisol: Post-Threat.** For post-threat cortisol there were no significant covariates. There was a significant effect of condition on post-threat percent change in cortisol after controlling for the effect of body fat percentage, trait body image, and strength,  $F_{(1,63)} = 6.41, p = .014, \eta_p^2 = .09$ . Participants in the high-threat condition showed a significantly greater percent increase in cortisol pre- to post-threat compared to those in the low-threat condition (see Table 3 and Figure 5 and 6).

**Cortisol: Peak Response.** For peak response cortisol, there were no significant covariates. There was a significant effect of condition on peak response percent change in

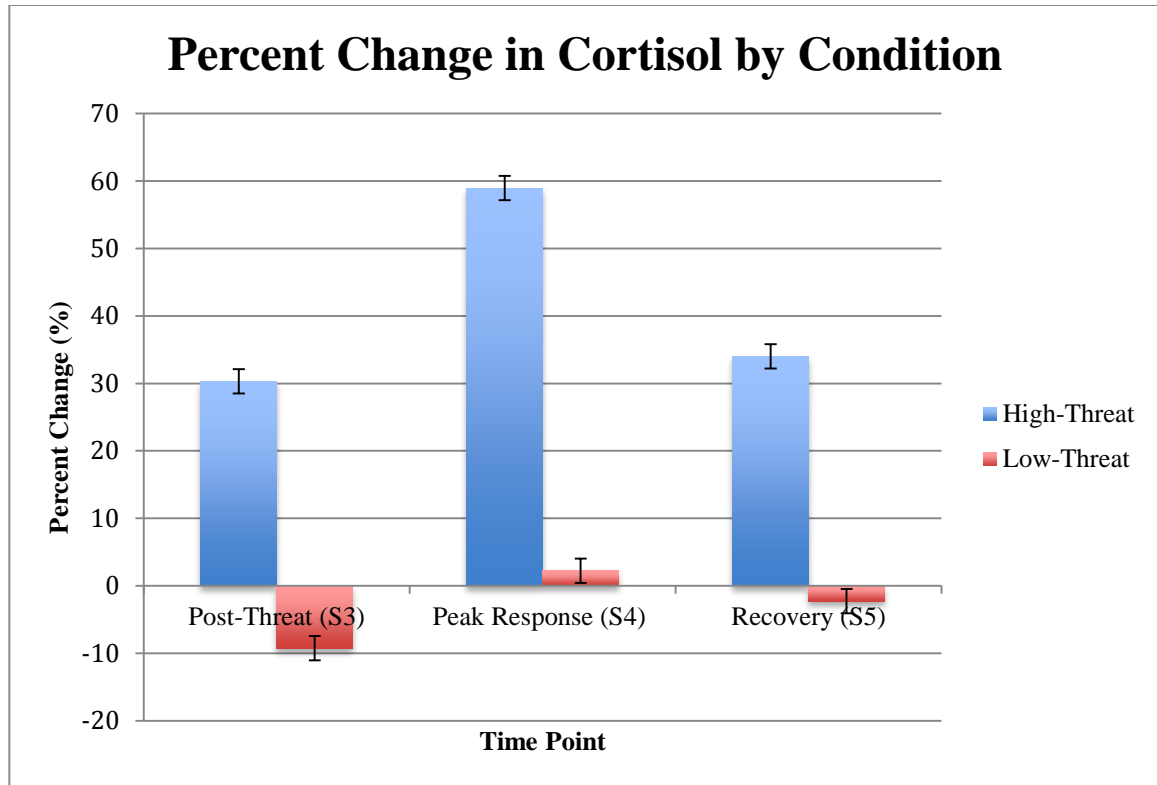
cortisol after controlling for the effect of body fat percentage, trait body image, and strength,  $F_{(1,63)} = 4.41$ ,  $p = .040$ ,  $\eta_p^2 = .06$ . Participants in the high-threat condition



**Figure 5:** Cortisol by Condition

showed a significantly greater percent increase in cortisol from pre-threat to peak response compared to those in the low-threat condition (see Table 3 and Figure 5 and 6).

**Cortisol: Recovery.** There were no significant covariates. There was no significant effect of condition on percent change in recovery cortisol after controlling for the effect of body fat percentage, trait body image, and strength,  $F_{(1,63)} = 2.49$ ,  $p = .119$ ,  $\eta_p^2 = .04$ . Thus, there were no significant differences for percent change in cortisol from pre-threat to recovery between the high-threat condition and the low-threat condition (see Table 3 and Figure 5 and 6).



**Figure 6: Percent Change in Cortisol by Condition**

**4.6.3 Research Question #3.** A hierarchical multiple regression analyses was conducted to test whether weight training moderated the relationship between condition and post-threat psychobiological responses.

**Body shame.** For step one, the overall model was significant, accounting for approximately 20% of the variance in post-threat body shame,  $F_{(2,66)} = 8.19, p = .001, R^2_{\text{adjusted}} = .18$ . On Step 2, there was no additional increase in variance accounted for,  $\Delta R^2 = .01$ , and the new model was no longer significant,  $F_{(3,65)} = .66, p = .420, R^2_{\text{adjusted}} = .17$ . Since the interaction term was non-significant, the model that included the main effects only was interpreted (Step one; Aiken & West, 1991; Frazier et al., 2004).

Significant main effects were found for the dummy coded condition variable ( $b_1 = .371, t(66) = 2.41, p = .019, \beta = .27$ ), and for the zero-centered weight training variable ( $b_1 =$



$= -.001, t(66) = -2.75, p = .008, \beta = -.31$ ). This means participants in the high-threat condition had greater post-threat body shame than participants in the low-threat condition.

**Social physique anxiety.** For step one, the overall model was significant, accounting for approximately 21% of the variance in post-threat social physique anxiety,  $F_{(2,65)} = .8.84, p = .000, R^2 \text{ adjusted} = .19$ . On Step 2, there was no additional increase in variance accounted for,  $\Delta R^2 = .01$ , and the new model was no longer significant,  $F_{(3,64)} = 1.17, p = .283, R^2 \text{ adjusted} = .19$ . The model that included the main effects only was interpreted (Step one; Aiken & West, 1991; Frazier et al., 2004). Significant main effects were found for the dummy coded condition variable ( $b_1 = .694, t(65) = 3.94, p = .000, \beta = .44$ ), but not for the zero-centered weight training variable ( $b_1 = .000, t(65) = -.72, p = .474$ ). This means that participants in the high-threat condition had greater post-threat social physique anxiety than participants in the low-threat condition.

**Body dissatisfaction.** For step one, the overall model was significant, accounting for approximately 25% of the variance in post-threat body dissatisfaction,  $F_{(2,66)} = 10.79, p = .000, R^2 \text{ adjusted} = .22$ . On Step 2, there was no additional increase in variance accounted for,  $\Delta R^2 = .001$ , and the new model was no longer significant,  $F_{(3,65)} = .065, p = .800, R^2 \text{ adjusted} = .21$ . Significant main effects were found for the dummy coded condition variable ( $b_1 = 1.150, t(66) = 3.78, p = .000, \beta = .41$ ), but not for the zero-centered weight training variable ( $b_1 = -.001, t(66) = -1.95, p = .056$ ). This means that participants in the high-threat condition had greater post-threat body dissatisfaction than participants in the low-threat condition.

**Cortisol: Post-Threat.** For step one, the overall model was non-significant,

accounting for approximately 2% of the variance in post-threat cortisol levels,  $F_{(2,66)} = .51, p = .605, R^2 \text{ adjusted} = -.02$ . On Step 2, there was no additional increase in variance accounted for,  $\Delta R^2 < .001$ ; the new model was also non-significant,  $F_{(3,65)} = .001, p = .980, R^2 \text{ adjusted} = -.03$ . No significant main effects were found for the dummy coded condition variable or the zero-centered weight training variable.

**Cortisol: Peak Response.** For step one, the overall model was non-significant, accounting for approximately 1% of the variance in peak response cortisol levels,  $F_{(2,66)} = .44, p = .643, R^2 \text{ adjusted} = -.02$ . On Step 2, there was no additional increase in variance accounted for,  $\Delta R^2 = .006$ ; the new model was also non-significant,  $F_{(3,65)} = .366, p = .547, R^2 \text{ adjusted} = -.03$ . No significant main effects were found for the dummy coded condition variable or the zero-centered weight training variable.

**4.6.4 Research Question #4.** To test the hypothesis that participants in the high-threat condition would exhibit behavioural expressions of shame to a greater extent than men in the low-threat condition, the principal student investigator and one research assistant watched the video recordings independently and coded behaviours using the Pride Coding System, which includes both shame- and pride-relevant behaviours (Tracy & Robins, 2007). After both the principal student investigator and the research assistant coded 20 videos, inter-rater reliability was calculated by doubling the number of codes that the two researchers agreed upon and dividing by the total number of codes used. The two researchers met to discuss any discrepancies that arose. Discussion continued until the two researchers reached consensus on all codes and ratings. Inter-rater reliability equaled .80 and was deemed adequate (Tracy & Matsumoto, 2008); therefore only the primary student investigator recorded the remaining videos.

To determine whether participants in the high-threat condition displayed shame-relevant behaviours to a greater extent than men in the low-threat condition, all shame codes were summed together and an independent samples *t*-test was conducted. Overall, participants in the high-threat condition exhibited shame-relevant behaviours to a greater extent than participants in the low-threat condition,  $t_{(61)} = -2.52, p < .05, d = .65$ . There were no differences between conditions for pride-relevant behaviours when all pride codes were summed together. Next, a series of sixteen independent samples *t*-tests was conducted, one for each code on the Pride Coding System. Results showed that participants in the high-threat condition displayed greater amounts of specific shame-relevant behaviours including head tilted forward/down,  $t_{(61)} = -2.26, p < .05, d = .58$ , and shoulders slumped forward,  $t_{(61)} = -2.58, p < .05, d = .66$  (see Table 5). Participants in the high-threat condition also displayed greater amounts of one or both hands in fists,  $t_{(61)} = -2.03, p < .05, d = .52$  and arms crossed on chest,  $t_{(61)} = -3.50, p = .001, d = .89$ , both of which are classified as pride components (See Table 5). In contrast, participants in the low-threat condition displayed greater amounts of pride-relevant behaviours including head tilted back/up,  $t_{(61)} = 3.38, p = .001, d = .87$ , smile,  $t_{(61)} = 2.22, p < .05, d = .57$  and chest expanded,  $t_{(61)} = 2.45, p < .05, d = .63$  (see Table 5). There were no significant differences between conditions for any other codes (see Table 5).

**Table 5***Means and Standard Deviations for the Pride Coding System*

	High-Threat	Low-Threat
<u>Variables</u>	<u>M (SD)</u>	<u>M (SD)</u>
Summed shame codes	8.54 (2.58)*	7.13 (1.78)
<i>Summed pride codes</i>	5.03 (1.87)	5.80 (2.11)
<i>Head tilted back/up</i>	.20 (.27)**	.50 (.42)
Head tilted forward/down	2.06 (.72)*	1.71 (.48)
<i>Smile</i>	.39 (.48)*	.66 (.50)
Moving hands to cover face or part of face	1.23 (.69)	.96 (.57)
Hiding face by moving face or head	.68 (.53)	.53 (.51)
<i>Eye gaze directed straight ahead</i>	.59 (.32)	.57 (.31)
<i>One or both arms out from body</i>	.78 (.40)	.90 (.40)
<i>One or both arms raised</i>	.11 (.19)	.23 (.34)
<i>One or both hands in fists</i>	.52 (.32)*	.35 (.33)
<i>Hands on hips</i>	.09 (.16)	.11 (.20)
<i>Arms crossed on chest</i>	.85 (.59)**	.38 (.49)
One or both arms limp at sides	1.41 (.61)	1.30 (.43)
<i>Chest expanded</i>	.48 (.53)*	.85 (.66)
<i>Torso pushed out/leaning back</i>	1.03 (.55)	1.25 (.75)
Chest narrowed inward	1.11 (.56)	.93 (.47)
Shoulders slumped forward	2.05 (.60)*	1.70 (.47)

*Note.* Pride-relevant codes are italicized; Shame-relevant codes are not italicized; Codes range from 0 (not at all present) to 5 (extreme intensity).

\*  $p < .05$ , \*\*  $p < .01$ .

## CHAPTER 5: DISCUSSION

The aim of the present study was fourfold: (1) to investigate the psychobiological responses to, and (2) recovery from, a social-evaluative body image threat in university men, (3) to examine weight training as a potential moderator of the expected psychobiological responses, and (4) to analyze men's behavioural responses to a social-evaluative body image threat, with particular focus on indicators of shame.

### 5.1 Descriptive Data

The participants from the present study represented a fit and active sample of university men. Body fat percentages for both conditions were classified as "good" (Jeukendrup & Gleeson, 2010). Participants were highly active in both conditions with mean scores for total weekly moderate and vigorous physical activity significantly greater than the amount recommended by the World Health Organization (WHO; 1200 MET-min./week) to attain health benefits (Pastuszak, Lisowski, Lewandowska, & Busko, 2014). Weight training frequency for both the high-threat condition and low-threat condition was also greater than the recommendations made by the WHO, which suggest that adults ages 18-64 should engage in muscle-strengthening activities on two or more days per week. Finally, men's scores on the muscularity subscale of the MBAS were comparable to other samples of college men (Tylka et al., 2005).

As previously noted, there were some statistically significant group differences between conditions for a number of variables, including: age, height, BMI, and body fat percentage. Appropriate steps were taken to address these differences statistically. In terms of body composition, participants in the low-threat condition were taller, had lower

BMI, and lower body fat percentages compared to participants in the high-threat condition. At first glance, it may appear that participants in the low-threat condition had more favourable body types than participants in the high-threat condition since height and leanness are both important factors to men's body image (McCabe et al., 2011; Tylka et al., 2005). On the other hand, participants in the low-threat condition may have perceived themselves as insufficiently muscular (McCabe et al., 2011). Further, the relationship between body composition and body image is complex. Caution should be taken before asserting that one condition had a more favourable body type than the other. To account for these group differences, body fat percentage, which is known to be a more valid direct measure of body composition compared to BMI, was entered as a covariate in all analyses.

## **5.2 Hypotheses #1 and #2: Post-Threat and Recovery Psychobiological Responses**

**5.2.1 Post-threat psychological responses.** The first research objective examined psychobiological responses to a social-evaluative body image threat. Consistent with the first hypothesis, results showed that participants in the high-threat condition found the social-evaluative body image threat more psychologically threatening than those in the low-threat condition. Specifically, participants in the high-threat condition reported significantly greater levels of body shame, social physique anxiety, and body dissatisfaction immediately post-threat, compared to participants in the low-threat condition, after controlling for pre-threat scores, body fat percentage, and trait body image (MBAS muscularity subscale). These findings are consistent with, and comparable in magnitude to, previous research that investigated men's psychobiological responses to a social-evaluative body image threat. Ozimok et al. (in progress) found that men who

experienced a social-evaluative body image threat had significantly greater levels of body shame, social physique anxiety, and body dissatisfaction immediately post-threat compared to men in a low-threat condition.

Findings from the present study are also consistent with previous qualitative research. Marquez and McAuley (2001) investigated situations of varying physical evaluation potential in university men and women. Lamarche et al. (in progress) investigated uncomfortable body image situations in university men. Men from both studies described uncomfortable situations as those that involved wearing less clothing (i.e., being shirtless), being in the presence of a muscular, ideal male, and being in the presence of an attractive female. Given that the high-threat condition involved all three of these factors, while the low-threat condition involved none of them, it was expected that participants in the high-threat condition would find the manipulation more threatening psychologically.

The results of the present study are also consistent with previous research in women. A number of studies have investigated women's body image using SSPT and demonstrated experimental support for a psychological response following actual exposure to (Lamarche et al., 2016) or anticipation of social-evaluative body image threat (Cloudt et al., 2014; Lamarche et al., 2014). For example, Lamarche et al. (2016) found that women who were exposed to an actual social-evaluative body image threat, which involved an assessment of body composition while wearing a bathing suit, had greater levels of social physique anxiety compared to a control group. Similarly, Cloudt et al. (2014) found that women who anticipated a social-evaluative body image threat (with either one or multiple evaluators) reported greater levels of social physique anxiety

compared to participants in a control condition. Overall, the results of the present study are consistent with previous research that has used SSPT to investigate men and women's psychological responses to social-evaluative body image threats.

The findings of the present study support the application of SSPT to investigate body image threats. SSPT claims that social-evaluative threats involve potential or explicit rejection and elicit shame and other self-conscious emotions (Dickerson, Kemeny et al., 2004; Gruenewald et al., 2004; Kemeny et al., 2004). Physical appearance is an important aspect of social acceptance and physical unattractiveness can lead to social exclusion (Baumeister & Tice, 1990). In the present study, participants in the high-threat condition reported greater levels of body shame compared to those in the low-threat condition. Participants in the high-threat condition may have perceived themselves as inadequate or inferior because their measurements of body size and strength were less similar to the ideal in comparison to the confederate's measurements. Additionally, participants in the high-threat condition were deliberately made to feel that their bodies were being evaluated, which led to higher levels of post-threat social physique anxiety, compared to participants in the low-threat condition (Grieve et al., 2008; Kruisselbrink et al., 2004).

**5.2.2 Post-threat and peak response cortisol.** Consistent with the second hypothesis, participants in the high-threat condition had significantly greater percent increases in cortisol from pre- to post-threat (taken approximately 21 min. after the onset of the threat) and pre-threat to peak response (taken approximately 30 min. after the onset of the threat) compared to participants in the low-threat condition, after controlling for strength, body fat percentage, and trait body image (MBAS muscularity subscale). These



findings are consistent with previous research that investigated men's cortisol responses to a social-evaluative body image threat. Ozimok et al. (in progress) also found that men who experienced a social-evaluative body image threat had significantly greater post-threat cortisol levels compared to those in a low-threat condition.

The results of the present study are also similar to previous research that has investigated women's cortisol levels following a social-evaluative body image threat. Lamarche et al. (2016) found that women who underwent a test of body composition in a two-piece bathing suit experienced significant increases in cortisol while those in a control condition did not. Similarly, previous research has shown that women who anticipated a social-evaluative body image threat had significantly greater cortisol levels compared to those in a control condition (Cloudt et al., 2014; Martin Ginis et al., 2012). However, the significant differences in post-manipulation cortisol levels between groups were due to reductions of cortisol levels in the control groups, rather than increases in the threat groups (Cloudt et al., 2014; Martin Ginis et al., 2012). In the present study, consistent with Lamarche et al. (2016), the difference between groups for post-threat cortisol was due to an increase in cortisol in the high-threat condition.

Other research that investigated women's cortisol responses to the anticipation of a social-evaluative body image threat found no significant differences between cortisol levels in the threat and control condition (Lamarche et al., 2014). Thus, while cortisol responses may be affected by the anticipation of a social-evaluative body image threat, independent of actual exposure to a threat (Cloudt et al., 2014; Martin Ginis et al., 2012), findings of the present study support the growing evidence that actual exposure to a threat may be necessary to elicit increases in cortisol (Dickerson & Kemeny, 2004; Dickerson et

al., 2008; Lamarche et al., 2016; Ozimok et al., in progress).

The current findings are also consistent with SSPT, which claims that social-evaluative threats elicit a psychobiological response including shame and cortisol (Dickerson & Kemeny, 2004; Gruenewald et al., 2004; Kirschbaum et al., 1993). Performance tasks containing uncontrollable and social-evaluative elements have been associated with significant increases in cortisol. Dickerson and Kemeny (2004) identified three important aspects of a social-evaluative threat in their meta-analysis: a permanent record of performance, the presence of an evaluative audience, and the potential for negative social comparison. The present study incorporated all of these elements into the high-threat condition. The manipulation was uncontrollable because participants were likely to fail to meet the ideal in comparison to the male confederate and could not improve their results despite their best efforts. It also involved social-evaluative elements. The video camera was used to create a permanent record, an evaluative audience was present, and the male confederate, as well as the provision of normative feedback, encouraged the potential for negative social comparison. Therefore, it was expected that participants in the high-threat condition would have greater cortisol levels post-threat compared to participants in the low-threat condition.

In conclusion, consistent with the hypothesis, participants in the high-threat condition had significantly greater post-threat body shame, social physique anxiety, and body dissatisfaction, than participants in the low-threat condition. Participants in the high-threat condition also had greater percent increases in cortisol from pre- to post-threat and pre-threat to peak response compared to participants in the low-threat condition. Participants' psychological and physiological responses to the social-evaluative body

image threat were consistent with SSPT (Dickerson & Kemeny, 2004) and previous body image research in university men (Ozimok et al., in progress) and women (Lamarche et al., 2016).

**5.2.3 Recovery psychobiological responses.** The second research objective examined psychobiological recovery from a social-evaluative body image threat. Consistent with the hypothesis, results showed that there were no significant differences between conditions for psychological responses or percent change in cortisol (from pre-threat cortisol) at the recovery time point (after a 30-minute rest period), after controlling for pre-threat scores, body fat percentage, and trait body image (MBAS muscularity subscale). Thus, men appear to recovery relatively quickly from a social-evaluative body image threat. This is the first study to investigate both the responses to, and recovery from, a social-evaluative body image threat in university men. Most research on SSPT and body image has investigated only responses to a threat and neglected to investigate recovery profiles (Dickerson & Kemeny, 2004). Investigating the recovery from a social-evaluative body image threat helps to provide a better understanding of the psychobiology of men's uncomfortable body image experiences.

The findings of the present study are consistent with previous research that investigated women's responses to, and recovery from, a social-evaluative body image threat. Lamarche et al. (2016) found that women who were exposed to an actual social-evaluative body image threat experienced significant increases in social physique anxiety and cortisol from baseline to post-threat. At the recovery time point, approximately 50 minutes after the onset of the threat, women's levels of social physique anxiety and cortisol returned to levels similar to baseline.

Similarly, Lamarche (2012) found that in response to an anticipatory social-evaluative body image threat, women's levels of body shame and social physique anxiety increased significantly from baseline to post-threat, and returned to levels similar to baseline at the recovery time point (approximately 50 minutes post-threat). In the control condition, there were no differences between the three time points for body shame, while social physique anxiety significantly decreased from baseline to the response time point; there were no significant differences for social physique anxiety between response and recovery or baseline and recovery. Cortisol levels decreased in both conditions from baseline to recovery, though the control condition had significantly lower levels at recovery.

The results of the present study suggest that men recover relatively quickly from social-evaluative body image threats in comparison to other types of psychosocial stressors. For example, Rohleder, Beilen, Chen, Wolf, and Kirschbaum (2007) found that ballroom dancers had significantly greater cortisol levels on competition days compared to control days (no competition or training) and that cortisol levels took up to six hours to return to baseline after the competition. Moreover, cortisol levels have been found to remain elevated for up to one hour following a social-evaluative threat (Dickerson & Kemeny, 2004; Kirschbaum et al., 1993). In the present study, cortisol levels returned to baseline by approximately 50 minutes after the onset of the threat. Thus, the findings of the present study with respect to cortisol recovery from a social-evaluative body image threat appear to be favourable in comparison to cortisol recovery from other performance-based social-evaluative threats.

It is possible that social-evaluative body image threats are less threatening or

shorter-lived than other types of stressors. The quick recovery in the present study may also reflect the way that men have become accustomed to uncomfortable body image situations in their daily lives. Other types of stressors may be less familiar to men and may lead to greater amounts of post-threat rumination than social-evaluative body image threats, and subsequently prolonged, elevated levels of cortisol (Zoccola & Dickerson, 2012). The quick recovery witnessed in the present study may also be due to the relatively small spike in cortisol that participants experienced following the threat. Recovery from uncontrollable, social-evaluative tasks is largely connected to the magnitude of the cortisol response associated with these tasks (Dickerson & Kemeny, 2004).

In sum, participants in the present study recovered from a social-evaluative body image threat relatively quickly compared to other types of psychosocial stressors (Dickerson & Kemeny, 2004; Rohleder et al., 2007). The recovery profile witnessed in the present study is consistent with previous research that investigated women's recovery from an actual or anticipatory social-evaluative body image threat (Lamarche et al., 2016; Lamarche, 2012).

#### **5.4 Hypothesis #3: Weight Training as a Moderator of Psychobiological Responses**

The third research objective examined weight training as a potential moderator of the psychobiological responses to a social-evaluative body image threat. Inconsistent with the hypothesis, weight training did not moderate the relationship between condition and post-threat psychobiological responses. Contrary to the present findings, previous research has found that regular exercisers show reduced psychobiological reactivity to acute stressors, unrelated to the body, compared to non-exercisers. Rimmelle et al. (2007)

found that trained men (elite athletes) had significantly lower cortisol levels, lower heart rates, better mood, and greater calmness following a social-evaluative threat compared to untrained men. Similarly, Rimmele et al. (2009) examined the level of physical activity (elite sportsmen, amateur sportsmen, untrained men) in relation to psychobiological reactivity to psychosocial stress. Following a social-evaluative threat, elite sportsmen had significantly lower heart rate, state anxiety and cortisol levels compared to untrained men. Amateur sportsmen showed reduced heart rate but no difference in cortisol response compared to untrained men. However, in these two studies it is unclear whether the reduced psychobiological reactivity was due to the exercise these men engaged in, or their status as elite athletes, since athletes report less negative body image than exercisers or inactive individuals (Hausenblas & Symons Downs, 2001). Nonetheless, other research has found that a 12-week aerobic exercise (Klaperski et al., 2014) or general fitness program (Calvo et al., 1996) can reduce psychobiological reactivity to psychosocial stressors in non-exercisers.

One explanation for the differences between the present findings and those of Rimmele et al. (2009) and Rimmele et al. (2007) is the type of exercise that led to the reductions in psychobiological reactivity. In the current study, weight training was the potential moderator. In Rimmele et al. (2007) elite sportsmen were athletes from endurance-trained sports. In Rimmele et al. (2009), sportsmen were medium to long distance runners. Previous research has shown that a cardiovascular exercise intervention can reduce psychobiological reactivity to psychosocial stressors in non-exercisers (Klaperski et al., 2014). Furthermore, regular cardiovascular exercise reduces physiological reactivity of the sympathetic nervous system to stressors in general (e.g.,

reduced heart rate response; Hamer, Taylor, & Steptoe, 2006; Whelton, Chin, Xin, & He, 2002). Thus, cardiovascular exercise may be more effective than weight training at reducing psychobiological reactivity to social-evaluative threats.

The non-significant findings of the present study may also have been due to measurement error. For the present study, a measure was designed and created by the researchers to assess weight training behaviour. While this measure was designed to resemble the short version of the IPAQ, there is little evidence of validity or reliability. It is also possible that participants' responses were subject to recall or social desirability bias, in which they may have overestimated their level of weight training to create a more positive impression (Martin, Sinden & Fleming, 2000).

On the other hand, it is possible that weight training does not moderate the psychobiological responses to a social-evaluative body image threat. It may be that certain men who engage in high levels of weight training do so because they have greater body image concerns and are heavily invested in their appearances (particularly with respect to muscularity), while other men who weight train frequently may do so for health or fitness benefits and may be more comfortable with themselves and have positive body image. This theory would make it difficult to detect a moderation effect because some participants who weight trained often may have been comfortable during the manipulation while others may have found it particularly threatening since they were asked to display attributes and skills (i.e., muscularity and strength) that were important to them (i.e., domain importance; Dickerson & Kemeny, 2004).

Alternatively, the manipulation used in the high-threat condition may have involved too many threatening factors to see a moderation effect. This manipulation

contained a number of elements designed to increase the evaluative potential and ultimately the intensity of the threat, including: a permanent record of performance (i.e., video recording), the presence of an evaluative audience (i.e., researchers and confederates), the potential for negative social comparison (i.e., male confederate, normative feedback, reading the confederate's results aloud; Dickerson & Kemeny, 2004), and the evaluation of body composition and strength (McCabe & Ricciardelli, 2004, Munroe-Chandler & Gammage, 2008). The inclusion of the male and female confederates and the requirement to be shirtless while measurements were taken are also factors that have been reported as threatening to men's body image (Marquez & McAuley, 2001). It is possible that there were too many threatening factors to see a moderation effect of weight training on the psychobiological responses. With that said, weight training may moderate the psychobiological responses to less complex social-evaluative body image threats that are more reflective of uncomfortable body image situations in real life (e.g., exercising at the gym; Frederick & Morrison, 1996; Lamarche et al., 2011; Martin et al., 2006; Rimmele et al., 2007).

#### **5.5 Hypothesis #4: Behavioural Responses**

The fourth research objective examined men's behavioural responses to a social-evaluative body image threat, with particular focus on indicators of shame. Consistent with the fourth hypothesis, men in the high-threat condition exhibited behavioural expressions of shame to a greater extent than men in the low-threat condition. The behavioural displays for shame can be indicated by a simple head tilt downward, though the full shame expression may include slumped shoulders and a narrowed chest (Gilbert, 2000; Keltner, 1995). In the present study, participants in the high-threat condition



displayed greater amounts of “head tilted forward/down” and “shoulders slumped forward” than participants in the low-threat condition. Participants in the high-threat condition also displayed greater amounts of “arms crossed on chest” and “one or both hands in fists” compared to men in the low-threat condition. While these two behaviours are categorized as pride components on the Pride Coding System, they are only thought to represent pride when combined with a smile (Tracy & Robins, 2007). In the present study, these behaviours were often observed in combination with “head tilted forward/down” and “shoulders slumped forward.” Therefore, these behaviours likely reflected the motivational states (e.g., submission, withdrawal) associated with shame, rather than pride (Dickerson, Gruenewald et al., 2004). With respect to pride-relevant behaviours, participants in the low-threat condition displayed greater amounts of “head tilted back/up”, “smile”, and “chest expanded” than participants in the high-threat condition.

This was the first study to investigate the behavioural responses to a social-evaluative body image threat. To date, limited research has explored the behavioural outcomes associated with shame (Gilbert, 2000; Keltner, 1995; Tangney et al., 1996). This may be due to the lack of measures available for analyzing shame-relevant behaviours. For the present study, the Pride Coding System (Tracy & Robins, 2007), which includes items for identifying shame, was used to analyze participants’ nonverbal, behavioural expressions of shame and to complement the data collected through self-report questionnaires. Self-report measures can present challenges since participants must be aware of their emotions, be able to distinguish them from similar emotions, and be willing to reveal them to researchers (Keltner & Harker, 1998; Tracy & Robins, 2007).

Often, these assumptions are not met since emotions can occur at an implicit level and participants may not feel comfortable disclosing them (Keltner & Harker, 1998).

Moreover, participants can easily confuse similar emotions, especially self-conscious emotions. Thus, it is important to investigate behavioural responses to social-evaluative body image threats to complement self-report measures (and physiological data), and ultimately provide a more complete picture of how men react to body image threats.

The behavioural responses observed in the present study were consistent with previous research on SSPT and body image coping. According to SSPT, social-evaluative threats elicit psychobiological responses (shame and cortisol), which lead to appeasement, disengagement, and submissive behaviours (e.g., appearing smaller, wanting to hide; Dickerson, 2008; Dickerson, Gruenewald et al., 2004; Dickerson & Kemeny, 2004; Gruenewald et al., 2004; Kemeny et al., 2004). In the present study, participants' behavioural responses to a social-evaluative body image threat were consistent with their psychological and physiological responses. Participants in the high-threat condition self-reported greater levels of shame, had higher cortisol levels and exhibited behavioural expressions of shame to a greater extent, than participants in the low-threat condition. Moreover, in the high-threat condition, shame behaviours were positively correlated with all post-threat and recovery psychological variables. These findings reflect the concept of triangulation where a combination of several research methods is used to investigate the same phenomenon. Ultimately these findings provide converging evidence that increases the validity and credibility of results.

Participants in the high-threat condition may have exhibited shame-relevant behaviours to appease the evaluators who observed the participants' "failure" to resemble the ideal during the threat (Keltner, 1995). By acknowledging an awareness of their failure, participants may have attempted to demonstrate their understanding of social norms in order to remain trusted members of the group (Tracy & Matsumoto, 2008). Similar behavioural displays have been seen to denote submission in primates and other animals (Dickerson, Gruenewald et al., 2004; Tracy & Matsumoto, 2008).

Participants' shame-relevant behaviours also reflected avoidance coping strategies, which include trying to ignore, hide from, escape, or prevent threatening body image situations (Cash et al., 2005). For example, participants in the high-threat condition often had their heads down while the confederate was being tested. This may have been a strategy for ignoring the situation at hand (i.e., cognitive avoidance). Previous qualitative research on men's body image coping has found that men commonly use avoidance and appearance fixing coping strategies for handling uncomfortable body image situations (Lamarche et al., in progress).

The shame-relevant behaviours in the present study were only observed at a very mild or mild intensity (0-2), on the Pride Coding System's scale ranging from 0 = *not visible at all* to 5 = *extreme intensity*. While this may have been due to cultural norms in North America, where displaying the full expression of shame is discouraged (Tracy & Matsumoto, 2008), it could also have to do with the way that participants' behaviours were analyzed. Each participant's session and video recording was approximately 75 minutes. Shame-relevant behaviours were usually only expressed for a short amount of time. Therefore, behaviours were often coded with a low intensity. Previous research has

used the Pride Coding System to analyze photographs rather than videos (Tracy & Matsumoto, 2008). Given the complex nature of ongoing body image threats, it would be difficult to capture behavioural responses in a photograph.

In conclusion, consistent with the hypothesis, participants in the high-threat condition displayed greater amounts of shame-relevant behaviours than participants in the low-threat condition. These findings were consistent with participants' cortisol levels and self-report measures. Participants' behavioural responses were also consistent with SSPT and avoidance coping strategies. Although the main focus of the fourth research objective was shame-relevant behaviours, it was also found that participants in the low-threat condition displayed greater amounts of specific pride-relevant behaviours than participants in the high-threat condition.

## **5.6 Limitations**

While the findings of the present study contribute to the literature on men's body image, there are some limitations that should be addressed. First, the findings of the present study can only be generalized to a specific set of university men. The sample for the present study included men between the ages 17 and 25 with no history of a clinical eating disorder and not on anti-depressants or any other medications that could affect cortisol levels. The majority of the participants were Caucasian (64%) and came from kinesiology or physical education programs (49%). Additionally, although there was a range of weight training behaviour, on average, participants were highly active.

Second, the lack of findings with regards to weight training as a potential moderator of the psychobiological responses to a social-evaluative body image threat may have been due to the relatively small sample size. A small sample size limits the

power to detect smaller effects, especially for interaction effects in moderation analyses. According to Tabachnick and Fidell (2007) over 500 hundred participants would have been necessary to detect a small effect size. This large sample size was not feasible for the present research project. Therefore, the primary reason for the lack of findings for the third hypothesis may have been the small sample size.

Third, while the true purpose of the study was concealed, the Brock Research Ethics Board required that posters included information about the anthropometric measurements and strength test that participants would have to undergo. Given the voluntary nature of participation, it is likely that the men who volunteered to participate in the present study on “physical characteristics, self-beliefs, and cortisol levels” were more comfortable with their body image than those who chose not to participate. Nonetheless the manipulation in the present study elicited a psychobiological and behavioural response.

Fourth, a number of self-report measures were used during the study. It is possible that participants’ responses may have been subject to recall or social desirability bias. Nevertheless, it is important to note that participants’ responses on the self-report measures at pre-threat, post-threat, and recovery, were consistent with their cortisol levels and behavioural responses, suggesting that participants filled out questionnaires honestly.

Fifth, there were significant group differences between conditions for pre-threat social physique anxiety and pre-threat body dissatisfaction, with the high-threat condition reporting greater levels of both, compared to the low-threat condition. Given that conditions did not differ in terms of trait body image, these group differences were likely due to the difference in the environments between conditions, in which participants

completed their pre-threat measures (e.g., presence of the confederates and video camera in the high-threat condition; Dickerson & Kemeny, 2004; Lamarche et al., in progress). To account for these group differences, pre-threat social physique anxiety, body dissatisfaction and body shame were entered as covariates in each analysis respectively.

Sixth, at the end of each session, participants were debriefed about the true purpose of the study and asked to refrain from discussing this information with others since data collection was still ongoing. Although it was assumed that no participants were aware of the true purpose before participating, it is possible that this assumption was not met.

There were also limitations with regards to video analysis. First, in the high-threat condition, participants were informed that they were being videotaped while their anthropometric and strength measures were taken. Thus, participants may have acted differently during this time interval because they knew that they were being recorded (Dickerson & Kemeny, 2004). Second, as previously mentioned, the Pride Coding System (Tracy & Robins, 2007) was used to analyze participants' video recordings following the completion of all data collection. Given that each session lasted approximately 75 minutes, certain behaviours were only present for a short amount of time, and subsequently coded at a low intensity. Additionally, the Pride Coding System only includes shame- and pride-relevant behaviours. There may be other behaviours that are important to analyze with regards to the way men react to, and cope with, uncomfortable body image situations.

## **5.7 Contributions**

**5.7.1 Research.** This study was the first to investigate the psychobiological

responses to, and *recovery from*, a social-evaluative body image threat in university men. The present study refined previously used procedures (Ozimok et al., in progress) to ensure that all questionnaires and saliva samples were completed at the same time point in each condition. A quiet rest period was also added to investigate men's recovery from a social-evaluative body image threat. Additionally, the present study was the first to investigate men's behavioural responses to a social-evaluative body image threat. The Pride Coding System was used to analyze participants' voluntary (and in the moment) nonverbal behaviours (Tracy & Robins, 2007). This was the first study to use the Pride Coding System for video analysis, which may be more beneficial than photo analysis when it comes to investigating behavioural responses to ongoing body image threats. Lastly, in the present study a measure of weight training behaviour was created to investigate weight training as a potential moderator of men's psychobiological responses to a social-evaluative body image threat. This measure may be used to further investigate the relationship between weight training and men's body image.

**5.7.2 Body image.** The present study provided support for the assertion that men are susceptible to uncomfortable body image experiences (Ozimok et al., in progress). More specifically, the present study confirmed factors identified qualitatively that are threatening to men's body image (e.g., being shirtless, being in the presence of an ideal male and/or an attractive female; Lamarche et al., in progress; Marquez & McAuley, 2001). This study was also the first to examine men's recovery from a social-evaluative body image threat and found that men recovered relatively quickly from this type of threat, especially in comparison to other types of psychosocial stressors (Dickerson & Kemeny, 2004; Rohleder et al., 2007). Thus, previous research that investigated only

responses to social-evaluative body image threats, but neglected the recovery phase, may have overestimated the negative effects associated with these types of threats.

Findings of the present study also help to provide a more complete picture of how men respond to, and cope with, social-evaluative body image threats. This was the first study to investigate behavioural responses to a body image threat. Examining behavioural responses helps to explain how men deal with body image threats while they are experiencing them. Additionally, behavioural analysis complements the data gathered through self-report measures (and saliva samples), and ultimately helps to provide a more in depth understanding of how men react to uncomfortable body image experiences. Lastly, the present study contributes to the literature on the relationship between exercise and body image and suggests that weight training does not moderate men's psychobiological responses to a social-evaluative body image threat.

## **5.8 Implications**

**5.8.1 Research.** The present study provides a refined protocol for examining men's responses to, and recovery from, a social-evaluative body image threat. This refined protocol can be used to investigate potential moderators (e.g., positive body image) as well as the response-recovery profile to a social-evaluative body image threat in other samples (e.g., athletes, adolescents). The present study also suggests that psychological, physiological, and behavioural outcomes should be considered when investigating body image, and provides a means for doing so. To date, a number of studies have examined men's (Ozimok et al., in progress) and women's (Cloudt et al., 2014; Lamarche et al., 2014; Lamarche et al., 2016; Martin Ginis et al., 2012) psychobiological responses to social-evaluative body image threats. Overall, past



research suggests that men and women respond to social-evaluative body image threats in a manner that is consistent with SSPT (i.e., shame and cortisol). The findings of the present study support the contention that an actual exposure to a threat, rather than an anticipatory threat, is necessary to elicit a cortisol response (Lamarche et al., 2016, Martin Ginis et al., 2012). In addition, the current findings further extend the applicability of SSPT to behavioural responses to a social-evaluative body image threat. Lastly, the findings of the present study can be used to structure exercise settings in a way that minimizes or eliminates elements that have been identified as threatening to men's body image (e.g., conducting body composition assessments for men in private settings).

**5.8.2 Body image.** In the present study, men responded to, and recovered from, a social-evaluative body image threat relatively quickly. It is worth noting that participants in the present study remained in the presence of the male and female confederates for the duration of their 30-minute quiet rest recovery period. Being in the presence of a muscular male and an attractive female are factors that contribute to uncomfortable body image situations for men (Marquez & McAuley, 2001). Therefore, being able to recover relatively quickly while still in an environment that most men deem to be uncomfortable is particularly promising. In real life, when faced with a social-evaluative body image threat, men may be able to leave the threatening environment, which may subsequently lead to a faster recovery than the one in the present study. The findings of the present study also suggest that social-evaluative body image threats may be less threatening to young men in comparison to other types of performance-based social-evaluative threats (e.g., ballroom dancing; Dickerson & Kemeny, 2004; Rohleder et al., 2007).

According to SSPT, an efficient psychobiological response to, and recovery from,

a social-evaluative threat is adaptive in nature (Gruenewald, et al., 2007). Thus, findings from the present study may be viewed in a positive light. The relatively quick response and recovery seen in the present study suggests that men may be capable of recovering quickly from similar social-evaluative body image threats in real life. Moreover, the efficient recovery suggests that men may avoid the negative health outcomes associated with prolonged elevated levels of shame and cortisol (Dickerson et al., 2009; Dickerson, Gruenewald et al., 2004; Dickerson & Kemeny, 2004; Kemeny et al., 2004). This hypothesis would be particularly encouraging for men who experience uncomfortable body image situations on a daily basis, such as going to the gym (Marquez & McAuley, 2001; Lamarche et al., in progress). However, given the limited research on recovery from social-evaluative body image threats, it cannot be concluded whether the response-recovery profile witnessed in the present study was adaptive or maladaptive (Lamarche et al., 2016).

Weight training did not moderate men's psychobiological responses to a social-evaluative body image threat in the present study. While exercise has been associated with a more positive body image (Campbell & Hausenblas, 2009), the findings of the present study suggest that all men, even those who weight train frequently, may be susceptible to responding to uncomfortable body image situations. Although exercise can bring men closer to attaining the muscular ideal, it may not be enough to combat society's extreme beauty standards. The findings of the present study can be used to structure exercise settings in a way that minimizes or eliminates elements that have been identified as threatening to men's body image (e.g., conducting body composition assessments for men in private settings).

In the present study men exhibited behaviours consistent with shame and avoidance coping strategies in response to a social-evaluative body image threat. This finding suggests that men may use avoidance coping strategies when faced with social-evaluative body image threats in real life. Thus, men may avoid situations or environments where their bodies may be exposed and susceptible to social evaluation. Such environments may include: the gym, the beach or even the hospital. These findings highlight the importance of researching healthy, adaptive coping strategies that men can use instead of avoidance strategies to manage uncomfortable body image situations.

## **5.9 Future Directions**

There are a number of future directions that should be explored in order to better understand how men can effectively cope with uncomfortable body image situations. First, future research should continue to explore the possibility that other types of exercise, such as aerobic exercise (Rimmele et al., 2009) or yoga (Flaherty, 2014), may moderate men's responses to social-evaluative body image threats. For example, aerobic exercise could be investigated using an objective measure such as an accelerometer or a fit bit. Alternatively, researchers could conduct a study with an exercise intervention to elucidate the effects of exercise on the expected psychobiological responses to a social-evaluative body image threat. Previous research has shown that a 12-week exercise intervention can reduce psychobiological reactivity to social-evaluative threats unrelated to the body in non-exercisers (Calvo et al., 1996; Klaperski et al., 2014).

Second, researchers should examine other potential moderators of the expected psychobiological responses following a social-evaluative body image threat. Potential moderators may include positive body image constructs (e.g., body pride, body

appreciation) and appearance investment. Moreover, researchers should investigate the potential moderating effects of exercise in combination with other types of adaptive body image coping strategies.

Third, future research should investigate which aspects of the social-evaluative body image threat participants found most threatening. They should also consider other factors that may increase or decrease the social-evaluative potential during uncomfortable body image situations (e.g., number of evaluators, setting, task; Ozimok et al., in progress). Investigating specific aspects of the manipulation that make it more or less threatening will provide researchers with a better understanding of men's uncomfortable body image situations and how to cope with them. It will also help researchers to investigate the intensity of men's body image threats that occur in real life. While there would be a number of challenges involved, future research should investigate men's psychobiological and behavioural responses to real life body image threats, and whether or not men who regularly experience these types of threats habituate to them or become susceptible to negative health outcomes. This line of research could also examine the relationship between men's trait body image and daily cortisol levels.

Fourth, future researchers should investigate how other populations respond to, and recover from, social-evaluative body image threats. The present study found that healthy university men responded to and recovered relatively quickly from a social-evaluative body image threat. It is possible that men from other groups (e.g., athletes, adolescents, older adults) would respond and recover differently. Additionally, it is important to investigate whether or not the response-recovery profile observed in the present study is considered adaptive or maladaptive, particularly from a health

perspective (Gruenewald et al., 2007; Lamarche et al., 2016). Even though participants recovered relatively quickly, it is possible that the rapid response may lead to negative health (e.g., depression; Olivardia et al., 2004) or behavioural outcomes (e.g., avoiding exercise in public facilities; Frederick & Morrison, 1996). It would also be beneficial to examine which characteristics separated individuals who were less versus more likely to be affected by the threat and individuals who recovered slowly versus quickly (Lamarche et al., 2016).

Fifth, future researchers should continue to work on developing an appropriate control or low-threat condition for investigating social-evaluative body image threats (Lamarche et al., 2016; Martin Ginis et al., 2012). Developing an equivalent control or low-threat condition that is matched in terms of body image content is important for researching body image threats effectively. Additionally future researchers should consider the development of a measure that includes shame-relevant behaviours and other body image coping strategies (i.e., avoidance strategies) that is designed for video analysis and can be used to investigate men's behavioural responses to body image threats. Given that pride-relevant behaviours were exhibited by men in the present study, future researchers may also want to investigate pride-relevant behavioural and psychological responses to social-evaluative body image threats. Lastly, while the present study used SSPT to investigate men's responses to a social-evaluative body image threat, other theories such as self-objectification theory and social comparison theory should also be considered when investigating men's uncomfortable body image situations.

## 5.10 Conclusion

In conclusion, the present study examined men's psychobiological and behavioural responses to, and recovery from, a social-evaluative body image threat, as well as the moderating effects of weight training on the expected psychobiological responses. Consistent with our first hypothesis and SSPT, participants in the high-threat condition had significantly greater levels of body dissatisfaction, social physique anxiety, body shame, and cortisol post-threat compared to participants in the low-threat condition. Despite the significant post-threat differences, there were no longer significant differences between conditions for psychobiological variables at the recovery time point. Thus, men responded to and recovered relatively quickly from the body image threat. Contrary to our hypothesis, weight training did not moderate the relationship between condition and post-threat psychobiological responses. Lastly, participants in the high-threat condition exhibited nonverbal behavioural displays of shame to a greater extent than men in the low-threat condition. Taken together, these findings show that most men, even frequent weight trainers, are susceptible to uncomfortable body image situations that elicit psychobiological and behavioural responses consistent with SSPT. These findings also suggest that men recover relatively quickly from social-evaluative body image threats. This study provides us with a more complete picture of men's uncomfortable body image situations and how they cope with them.

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## Appendix A: Questionnaires

### Demographic Questionnaire

Please complete the following information:

Age: \_\_\_\_\_

Major: \_\_\_\_\_

Ethnicity: \_\_\_\_\_

Sexual Orientation: \_\_\_\_\_

Did anything stressful or otherwise arousing happen to you earlier today or on your way here? Yes\_\_\_ No \_\_\_

If **yes** please indicate what happened?

What time did you wake up this morning? \_\_\_\_\_

Have you ever been diagnosed with Hepatitis B? \_\_\_\_\_

Do you smoke? \_\_\_\_\_

Are you a varsity athlete? \_\_\_\_\_

Are you on corticosteroids or anti-depressants? \_\_\_\_\_

If so, please list the medications \_\_\_\_\_

Are you currently taking or have you ever taken anabolic steroids? \_\_\_\_\_

Did you eat anything within one hour of this appointment? \_\_\_\_\_

Did you drink anything within one hour of this appointment? \_\_\_\_\_

Did you do any physical activity within one hour of this appointment? \_\_\_\_\_



Have you had any of the following anthropometric measures taken previously?

If yes, **circle** all that apply:

- Biceps circumference
- Waist circumference
- Chest circumference
- Skinfold testing for body composition assessment
- Underwater weighing
- Bioelectrical impedance
- Handgrip strength

### International Physical Activity Questionnaire (short)

The questions are about your time you spent being physically active in the last 7 days. They include questions about activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.


**Please answer each question even if you do not consider yourself to be an active person.**

In answering the following questions,

- **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal.
- **Moderate** physical activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal.

1a. During the last 7 days, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?


Think about ONLY those physical activities that you did for at least 10 minutes at a time.

\_\_\_\_\_ days per week  1b. How much time in total did you usually spend on **one** of those days during vigorous physical activities?  
\_\_\_\_\_ **hours** \_\_\_\_\_ **minutes**

**OR**

☐ **None**


2a. Again, think ONLY about those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles in tennis? DO NOT include walking.

\_\_\_\_\_ days per week  2b. How much time in total did you usually spend on **one** of those days during moderate physical activities?  
\_\_\_\_\_ **hours** \_\_\_\_\_ **minutes**

**OR**

☐ **None**

3a. During the last 7 days, on how many days did you do **walk** for at least 10 minutes at a time? This includes walking at work and at home, walking to travel from place to place, and any other walking that you did solely for recreation, sport, exercise or leisure.

\_\_\_\_\_ days per week  3b. How much time in total did you usually spend walking on **one** of those days?  
\_\_\_\_\_ **hours** \_\_\_\_\_ **minutes**

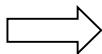
**OR**

☐ **None**

# WTB

1. Over the last 6 months, during a typical week, on average, how many days did you **WEIGHT TRAIN** for at least 10 minutes at a time? This includes lifting free weights, using weight machines and bodyweight activities.

\_\_\_\_\_ days per week



3b. How much time in total did you usually spend weight training on **ONE** of those days?

\_\_\_\_\_ hours \_\_\_\_\_ minutes

**OR**

☐

None

If you **DO NOT** currently weight train please skip the remaining questions on this questionnaire.

2. a) Were there any interruptions in your weight training during the last 6 months due to injury, illness, lack of motivation/time or any other reason? Yes \_\_\_\_\_ No \_\_\_\_\_

If **YES**:

b) Why did you stop weight training?

c) How long did you stop weight training for?

3. Which of the following represents the type of weight training you generally engage in? (Circle the answer that applies to you)

- a) Max Strength = 1-5 reps (2-5 sets per exercise)
- b) Optimal range/muscle mass = 8-12 reps (3-6 sets per exercise)
- c) Muscular endurance = 12-20 reps (2-4 sets per exercise)
- d) Other: \_\_\_\_\_

4. Why do you weight train?

5. a) In the last week, how many days did you weight train? \_\_\_\_\_

b) On average, how long (minutes) did each weight training session last? \_\_\_\_\_

6. a) How many years have you been weight training? \_\_\_\_\_

b) On a scale of 1 to 10 (1 = very low consistency; 10 = very high consistency), how consistently have you been weight training during these years? \_\_\_\_\_

7. Where do you typically engage in weight training? (Circle the answer that applies to you)

a) Public exercise facility

b) At home

c) Other: \_\_\_\_\_

### Male Body Attitudes Scale

Please read each item carefully then, for each one, circle the number that best applies to you.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>Never</b>	<b>Rarely</b>	<b>Sometimes</b>	<b>Often</b>	<b>Usually</b>	<b>Always</b>

1. I think I have too little muscle on my body.	1	2	3	4	5	6
2. I think my body should be leaner.	1	2	3	4	5	6
3. I wish my arms were stronger.	1	2	3	4	5	6
4. I feel satisfied with the definition in my abs (i.e., stomach muscles).	1	2	3	4	5	6
5. I think my legs are not muscular enough.	1	2	3	4	5	6
6. I think my chest should be broader.	1	2	3	4	5	6
7. I think my shoulders are too narrow.	1	2	3	4	5	6
8. I am concerned that my stomach is too flabby.	1	2	3	4	5	6
9. I think my arms should be larger (i.e., more muscular).	1	2	3	4	5	6
10. I feel dissatisfied with my overall body build.	1	2	3	4	5	6
11. I think my calves should be larger (i.e., more muscular).	1	2	3	4	5	6
12. I wish I were taller.	1	2	3	4	5	6
13. I think I have too much fat on my body.	1	2	3	4	5	6
14. I think my abs are not thin enough.	1	2	3	4	5	6
15. I think my back should be larger and more defined.	1	2	3	4	5	6
16. I think my chest should be larger and more defined.	1	2	3	4	5	6
17. I feel satisfied with the definition in my arms.	1	2	3	4	5	6
18. I feel satisfied with the size and shape of my body.	1	2	3	4	5	6
19. I am satisfied with my height.	1	2	3	4	5	6
20. Has eating sweets, cakes, or other high calorie food made you	1	2	3	4	5	6

feel fat or weak?						
21. Have you felt excessively large and rounded (i.e., fat)?	1	2	3	4	5	6
22. Have you felt ashamed of your body size or shape?	1	2	3	4	5	6
23. Has seeing your reflection (e.g., in a mirror or window) made you feel badly about your size or shape?	1	2	3	4	5	6
24. Have you been so worried about your body size or shape that you have been feeling that you ought to diet?	1	2	3	4	5	6

**BISS**

For each of the items below, check the box beside the one statement that best describes how you feel **RIGHT NOW AT THIS VERY MOMENT**. Read the items carefully to be sure the statement you choose accurately and honestly describes how you feel right now.

1. Right now I feel...

- ☐ **Extremely dissatisfied** with my physical appearance
- ☐ **Mostly dissatisfied** with my physical appearance
- ☐ **Moderately dissatisfied** with my physical appearance
- ☐ **Slightly dissatisfied** with my physical appearance
- ☐ **Neither dissatisfied nor satisfied** with my physical appearance
- ☐ **Slightly satisfied** with my physical appearance
- ☐ **Moderately satisfied** with my physical appearance
- ☐ **Mostly satisfied** with my physical appearance
- ☐ **Extremely satisfied** with my physical appearance

2. Right now I feel...

- ☐ **Extremely satisfied** with my body size and shape
- ☐ **Mostly satisfied** with my body size and shape
- ☐ **Moderately satisfied** with my body size and shape
- ☐ **Slightly satisfied** with my body size and shape
- ☐ **Neither dissatisfied nor satisfied** with my body size and shape
- ☐ **Slightly dissatisfied** with my body size and shape
- ☐ **Moderately dissatisfied** with my body size and shape
- ☐ **Mostly dissatisfied** with my body size and shape
- ☐ **Extremely dissatisfied** with my body size and shape

3. Right now I feel...

- ☐ **Extremely satisfied** with my weight
- ☐ **Mostly satisfied** with my weight
- ☐ **Moderately satisfied** with my weight
- ☐ **Slightly satisfied** with my weight
- ☐ **Neither dissatisfied nor satisfied** with my weight
- ☐ **Slightly dissatisfied** with my weight
- ☐ **Moderately dissatisfied** with my weight
- ☐ **Mostly dissatisfied** with my weight
- ☐ **Extremely dissatisfied** with my weight

4. Right now I feel...

- ☐ **Extremely** physically **attractive**
- ☐ **Very** physically **attractive**
- ☐ **Moderately** physically **attractive**
- ☐ **Slightly** physically **attractive**
- ☐ **Neither attractive nor unattractive**
- ☐ **Slightly** physically **unattractive**
- ☐ **Moderately** physically **unattractive**
- ☐ **Very** physically **unattractive**
- ☐ **Extremely** physically **unattractive**

5. Right now I feel...

- ☐ **A great deal worse** about my looks than I usually feel
- ☐ **Much worse** about my looks than I usually feel
- ☐ **Somewhat worse** about my looks than I usually feel
- ☐ **Just slightly worse** about my looks than I usually feel
- ☐ **About the same** about my looks than I usually feel
- ☐ **Just slightly better** about my looks than I usually feel
- ☐ **Somewhat better** about my looks than I usually feel
- ☐ **Much better** about my looks than I usually feel
- ☐ **A great deal better** about my looks than I usually feel

6. Right now I feel I look...

- ☐ **A great deal better** than the average person looks
- ☐ **Much better** than the average person looks
- ☐ **Somewhat better** than the average person looks
- ☐ **Just slightly better** than the average person looks
- ☐ **About the same** as the average person looks
- ☐ **Just slightly worse** than the average person looks
- ☐ **Somewhat worse** than the average person looks
- ☐ **Much worse** than the average person looks
- ☐ **A great deal worse** about than the average person looks



### WBRSS

Read each of the following statements carefully and circle the appropriate value following each statement.

**0 = Strongly disagree**

**1 = Disagree**

**2 = Neither agree or disagree**

**3 = Agree**

**4 = Strongly agree**

	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neither Agree or Disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>
1. <u>Right now</u> , I feel ashamed because others can see my body.	0	1	2	3	4
2. <u>Right now</u> , the appearance of my body is embarrassing for me in front of others.	0	1	2	3	4
3. <u>Right now</u> , I would rather hide somewhere because others can see my body.	0	1	2	3	4
4. <u>Right now</u> , I would be ashamed of myself if others knew how much I really weighed.	0	1	2	3	4
5. <u>Right now</u> , I would feel embarrassed if I had to physically exert myself in front of others.	0	1	2	3	4
6. <u>Right now</u> , the size of my clothes is embarrassing for me.	0	1	2	3	4

### State Social Physique Anxiety Scale

Read each of the following statements carefully and indicate the degree to which the statement is characteristic or true of you **right now**. Use the following scale. Circle the appropriate value following each statement.

- 1 = Not at all characteristic of me**  
**2 = Slightly characteristic of me**  
**3 = Moderately characteristic of me**  
**4 = Very characteristic of me**  
**5 = Extremely characteristic of me**

1. I feel uptight about my physique/figure	1	2	3	4	5
2. I am bothered by thoughts that the other people in the room are evaluating my weight or muscular development negatively	1	2	3	4	5
3. Unattractive features of my physique/figure make me nervous in this setting.	1	2	3	4	5
4. In this environment, I feel apprehensive about my physique/figure.	1	2	3	4	5
5. I am comfortable with how fit my body appears to the others.	1	2	3	4	5
6. It would make me uncomfortable to know that other people in the room were evaluating my physique/figure.	1	2	3	4	5
7. When it comes to displaying my physique/figure in this setting, I feel shy.	1	2	3	4	5
8. Sitting here, I feel nervous about the shape of my body.	1	2	3	4	5
9. I feel relaxed when it is obvious that others are looking at my physique/figure.	1	2	3	4	5

**Perceived Evaluative Threat**

Using the scale below, please circle the number that best corresponds to how threatening you think the situation was in terms of having your body evaluated.

0 = not at all

1

2

3

4 = extremely

### **Perceptions Questionnaire**

#### **Perceptions: Male Participant**

**How close was the other male participant to your perceptions of the muscular ideal?**

0 = not at all my perceptions of the muscular ideal

1

2

3

4 = my exact perceptions of the muscular ideal

#### **Perceptions: Female Research Assistant**

**How attractive do you perceive the female research assistant who took your measurements?**

0 = not at all attractive

1

2

3

4 = very attractive

## Appendix B: Pride Coding System

**Instructions for Coders:** For each of the following codes, please rate the intensity of the particular behavior or movement using the scale below. If the behavior or movement is not present, score it as 0.

0-----1-----2-----3-----4-----5

0 = Not at all visible; 1 = Present but very mild intensity; 3 = Moderate intensity; 5 = Extreme intensity

Behaviour	Pre	Ant.	Threat	Post	Recov.
<b>Head Codes</b>					
Head tilted back/up*					
Head tilted forward/down					
Smile*					
Moving hands to cover face or part of face					
Hiding face by moving face or head (in hands, onto ground, into upper arm, turning away, etc.)					
Eye gaze directed straight ahead					
<b>Arm Codes</b>					
One or both arms out from body*					
One or both arms raised*					
One or both hands in fists*					
Hands on hips*					
Arms crossed on chest*					
One or both arms limp at sides					
<b>Body Codes</b>					
Chest expanded*					
Torso pushed out/leaning back*					
Chest narrowed inward					
Shoulders slumped forward					

## Appendix C: Certificate of Ethics Clearance for Human Participant Research



Brock University  
Research Ethics Office  
Tel: 905-688-5550 ext. 3035  
Email: reb@brocku.ca

Bioscience Research Ethics Board

### Certificate of Ethics Clearance for Human Participant Research

DATE: October 19, 2015  
PRINCIPAL INVESTIGATOR: GAMMAGE, Kimberley - Kinesiology  
FILE: 15-013 - GAMMAGE  
TYPE: Masters Thesis/Project STUDENT: Aidan Smyth  
SUPERVISOR: Kimberley Gammage  
TITLE: An Examination of Physical Characteristics, Self-Beliefs, and Cortisol in University Men

#### ETHICS CLEARANCE GRANTED

Type of Clearance: MODIFICATION Expiry Date: 8/31/2016

The Brock University Bioscience Research Ethics Board has reviewed the above named research proposal and considers the procedures, as described by the applicant, to conform to the University's ethical standards and the Tri-Council Policy Statement.

Modification: Increased number of saliva samples and added one measure.

The Tri-Council Policy Statement requires that ongoing research be monitored by, at a minimum, an annual report. Should your project extend beyond the expiry date, you are required to submit a Renewal form before **8/31/2016**. Continued clearance is contingent on timely submission of reports.

To comply with the Tri-Council Policy Statement, you must also submit a final report upon completion of your project. All report forms can be found on the Research Ethics web page at <http://www.brocku.ca/research/policies-and-forms/research-forms>.

In addition, throughout your research, you must report promptly to the REB:

- Changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
- All adverse and/or unanticipated experiences or events that may have real or potential unfavourable implications for participants;
- New information that may adversely affect the safety of the participants or the conduct of the study;
- Any changes in your source of funding or new funding to a previously unfunded project.

We wish you success with your research.

Approved:

Sandra Peters, Chair  
Bioscience Research Ethics Board

**Note:** Brock University is accountable for the research carried out in its own jurisdiction or under its auspices and may refuse certain research even though the REB has found it ethically acceptable.

If research participants are in the care of a health facility, at a school, or other institution or community organization, it is the responsibility of the Principal Investigator to ensure that the ethical guidelines and clearance of those facilities or institutions are obtained and filed with the REB prior to the initiation of research at that site.